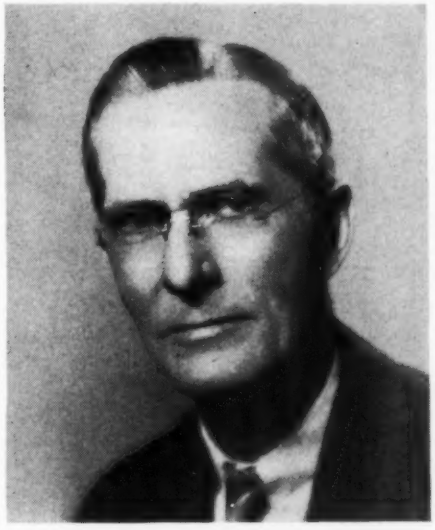
PUBLIC WORKS

city county and state

november 1949

LEADERS IN THE PUBLIC WORKS FIELD



Col. Francis F. Longley

Widely known, greatly liked and highly respected by all who know him, Frank Longley has had a part in solving engineering problems in many parts of the world. First, through his years as a consulting engineer; and second, during the past 25 years, through his association with Lock Joint Pipe Co., of which he is vice-president. A graduate of West Point and a special student at MIT, he returned to the Army in World War I and commanded the 26th Engineers in France. This, the first Engineer Water Supply Regiment, was largely his own conception, and it set a model for the Army for many years to come. Though he did not see active duty in World War II, his contributions were many, and his advice and assistance on problems of military procedure and military engineering are gratefully remembered by your editor, and no doubt by many others as well.

ROADSIDE REPORT *by H. Petrey of Arlington, Texas. Ford Model F-8 shown has a G.T.W. rating of 39,000 lbs. as a tractor. G.V.W. rating is 21,500 lbs.*

"My FORD moves this equipment 10 miles faster than 5 other makes I tried!"

"RECENTLY I purchased a Ford F-8 to haul a 50,000 lb. crane from job to job," reports H. Petrey of Arlington, Texas. "I must say this 145-horsepower Ford F-8 is the King of them all. It moves this equipment 10 miles faster and safer than the 5 different trucks of other makes that I have tried, to date. I am real proud of this BIG JOB."

In terms of *Payload-Performance* the Ford BIG JOBS have no equal in their class. No other truck offers so much payload capacity in relation to chassis weight with as high a horsepower rating per gross ton. This means bigger payloads within legal load limits. It means faster, more profitable delivery of big loads. Ford's high *Payload-Performance* is evidence of Bonus Built construction. Each of over 150 Ford Truck models is Bonus Built... built extra strong to last longer.

*BONUS: *"Something given in addition to what is usual or strictly due"—Webster*

FORD 1949 *Bonus* Built* TRUCKS 1951

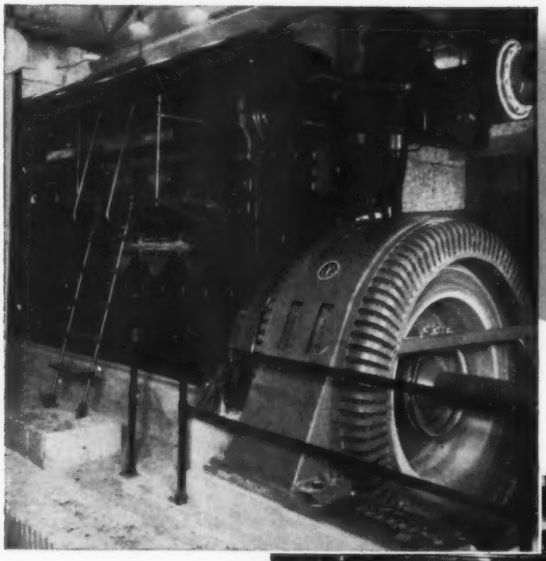
BUILT STRONGER TO LAST LONGER

USING LATEST REGISTRATION DATA ON 6,106,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

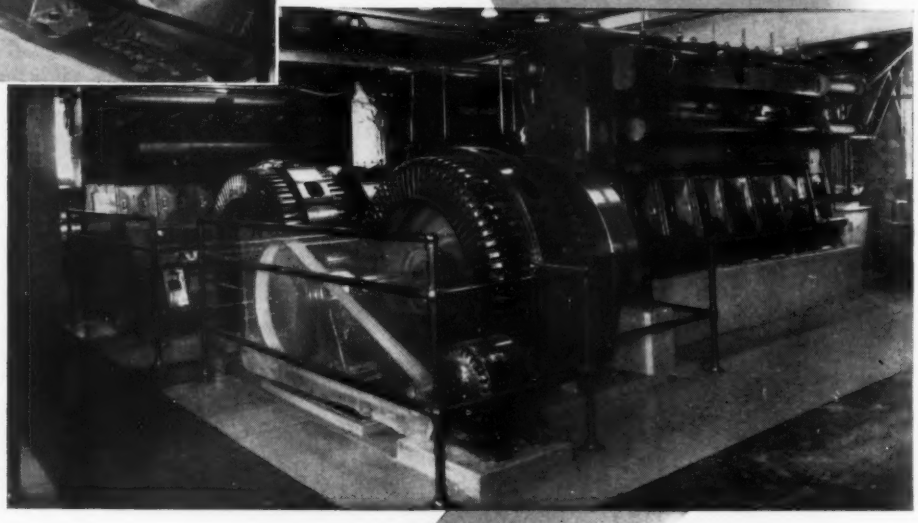
ONLY THE FORD BIG JOB HAS ALL THESE FEATURES

- ★ **New 145-h.p. Ford V-8 engine for top performance.**
- ★ **Ford concentric dual-throat carburetor for more power, more economy.**
- ★ **Big Ford power-operated hydraulic brakes; front 16-inch by 2¼-inch; rear 15-inch by 5-inch double cylinder on F-7, 16-inch by 5-inch double cylinder on F-8. Air brakes also available for F-8.**
- ★ **New heavy duty 5-speed transmissions—overdrive or direct-in-fifth—for operating flexibility.**
- ★ **Ford Super Quadrax single speed axles; two-speed axle available in Model F-8.**
- ★ **Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.**
- ★ **Million Dollar Cab with Ford Level Action suspension for greater driving comfort.**
- ★ **Nationwide service from over 6,400 Ford Dealers.**
- ★ **Ford Bonus Built construction for long truck life.**

Gross Vehicle Weight Ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross Combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.



Gold is where you find it



● Seven Superior Diesels helped a midwest quarry company find gold—gold in the form of reduced power costs. In only 12 years the use of Diesels reduced the cost of electrical power $156,000, *after all expenses, including depreciation, were deducted!*

But Superior Diesels supplied more than a low cost source of power—they also provided a dependable one. The engines are operated *at least 16 hours daily, 6 days a week, 52 weeks a year!*

Over and over again we hear similar reports about the outstanding performance provided by Superior Diesels. But that's not strange when you consider that Superior has all of the following advantages: Conservative Ratings • Fuel Economy • Precision Bearings • Heavy Rigid Crankshafts • Strong Bases and Cylinder Blocks • Proved Roller Chain Camshaft Drive • Oil Cooled Pistons.

Superior Diesels may be able to help you get gold from your power costs. We would like to discuss it with you—just drop us a line and tell us when it's convenient for you.

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

THE NATIONAL NSCO SUPPLY COMPANY

Superior DIESEL

When you need special information—consult READERS' SERVICE DEPT. on pages 65-69.

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Public Works

THE ENGINEERING AUTHORITY IN THE CITY-COUNTY FIELD

Edited by
W. A. HARDENBERGH and A. PRESCOTT FOLWELL

CONTENTS FOR NOVEMBER, 1949

Dozens of Containers

—but only One Truck

It's the Dempster-Dumpster System for Bulk Rubbish Collection at the Lowest Possible Cost!

In comparison with the conventional truck method of bulk rubbish collection, the Dempster-Dumpster System is simple, far more economical and efficient. It assures exacting sanitary conditions and wins the enthusiastic support of the people.

Minimum investment in rolling equipment is a major advantage. The Dempster-Dumpster System comprises a single truck hoisting unit which serves any number of containers, up to 10 cu. yd. capacity. Various designs are available to handle moist or dry materials. Containers are placed at convenient locations in business districts, housing sections, apartments, schools . . . wherever bulk rubbish accumulates. The Dempster-Dumpster Truck Hoisting Unit makes scheduled rounds, picks up each full container, hauls it, dumps it, and returns it. All containers are rat proof, fly proof, fire proof. Wind or scavengers cannot scatter trash. All of which are important to sanitation and public safety.

Shown at right are the three simple steps in handling a container—pick-up, hauling, and dumping. One man, the driver, handles the entire operation by hydraulic controls in the cab. The Dempster-Dumpster System is a complete, unified plan for bulk rubbish collection. A system, which, because of its tremendous savings, no town or city can afford to do without. Write today for complete information.

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TRADE MARK REG.

DEMPSTER BROTHERS, Inc.

9119 DEMPSTER BLDG. KNOXVILLE 17, TENN.

When you need special information—consult READERS' SERVICE DEPT. *on pages 65-69.*

THE EDITOR'S PAGE

Those Hardy Boars

ORGANIZED back in 1928, The Order of the Boar is still going strong. Originally a military sanitary engineering organization, its membership was expanded during the war so that it now includes engineers prominent in many fields. The Order was an important morale factor during the war, and it provided a basis for better cooperation and understanding among engineers all over the world. Meetings and initiations were held in every theater and in every continent. Now the Order is getting back into its post-war stride. Two meetings were held in October at two national conventions. Aside from the renewal of old friendships, there were the inimitable Boar initiations, which are the wonder and delight of those fortunate enough to attend. The outlook is good: There are many promising shoats; and Joe Gilbert, keeper of The Boar, reports his charge is "raring" to go. The Boars, with their fine history of pre-war and war-time accomplishment, seem fully qualified to keep their feet firmly in the trough of the future, and to continue to contribute to a better morale and a closer understanding among engineers. May their sign ever be upward.

Money is Not Always a Sinful Commodity

THE mere mention of finance in connection with the profession of engineering is often considered rude and even verging on the disgraceful. However, it is a well-known fact that engineers must eat, pay rent and buy shoes for the baby, just like other folks. Even cities and states, which employ engineers recognize this, but many of them feel that any pay, wage or salary in excess of the minimum is practically certain to lead engineers into serious temptations and even into bad company. These cities and states realize the luxuriant growth of evil that can take place on folding green paper media, and they are extremely reluctant to do anything that may further encourage sin—for instance, paying engineers on the same scale that other professional men are paid.

There is another phase of the matter that is also worthy of passing mention, for engineers are not wholly blameless in this matter. One of the few criticisms that can be made of the worthy gentlemen who are engaged in the practice of teaching young engineers is that they shun this matter of personal finance and they do not impress on their proteges that a desire for a good salary is not entirely incompatible with engineering. Perhaps this is due, in large part, to the fact that most colleges deem it a mortal sin to pay adequate salaries to their staffs, so that many of these college professors do not appreciate that a small amount of cash in hand is not fully equivalent to a one-way ticket to you know where. However that may be, many of our young engineers feel that it is little short of unethical for them to do anything that might make money for the firms by whom they are employed; and, in fact, some of them decline to become associated with any organization that is tainted with commercialism.

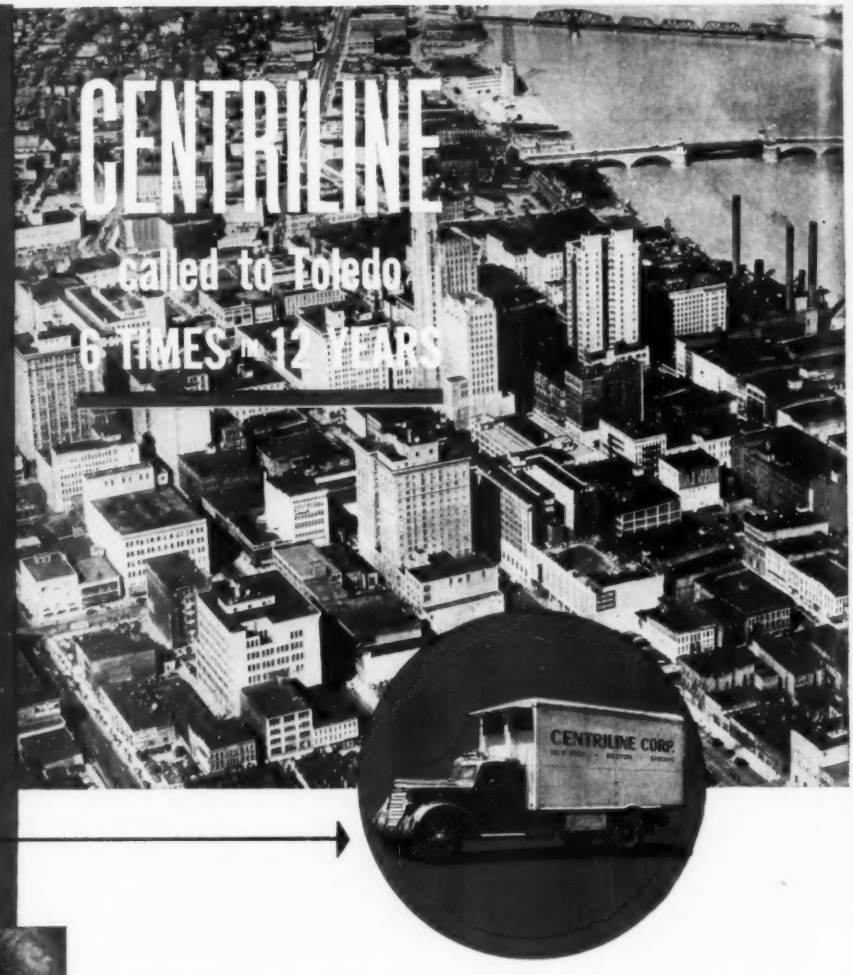
We do not wish to do anything that might break down or even weaken the high ideals of engineering, but we feel very strongly that money is not always a sinful commodity. In the hands of engineers it would no doubt be spent in a manner no worse—and no better—than by others; we do not believe that there would be any mass migration down the road paved with good intentions, with engineers trampling the crowd under foot.

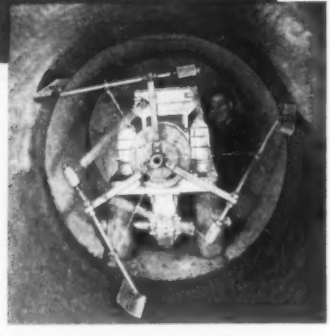
Engineers cannot rely on Santa Claus, for he is already quite busy caring for other groups in our national uneconomy. It is wholly up to the engineers themselves. Our own feeling is that they are quite largely to blame for having been, in a measure, passed by. We believe engineers, as a group, need more imagination and more initiative; a greater willingness to take responsibility; a more realistic appraisal of the need for selling themselves, their profession and engineering products; and, in fact, that the maintenance of the highest standards of professional ethics is not inconsistent with the acquisition of a reasonable amount of the well-known do-re-me.

A Disservice to Engineers

AMONG recent applications for membership in the engineering section of the American Public Health Association are listed a veterinarian, a food and drugs man, a sanitarian and a city chemist. It is possible, though highly improbable to us, that all of these men are qualified engineers; if they are not, no matter how fine men they may be or how well trained they are in their own specialty, the APHA is doing a distinct disservice to the profession of engineering if it accepts them as members of the engineering section. If, because there is no other appropriate section of the APHA for these men, it is necessary to let them enter through this door, then the name of the section ought to be changed. A tremendous effort is being made to get the military services to recognize engineers as professional folks; we ask them to clean their house in this respect, but it seems we are not inclined to follow our own advice.

where performance counts . . . count on Centriline





IN 1937, the city of Toledo, Ohio, asked Centriline to put a 3/16" cement mortar lining in 15,000 feet of brand new 48" welded steel pipe—after the line had been laid and tested. The results were so good that Toledo has since awarded Centriline 5 additional contracts.

There are many reasons for this success. Centrilining protects vital mains against tuberculation. It permanently increases carrying capacity—keeps down maintenance and pumping costs on new installations, often permits the use of smaller diameter pipe, resulting in lower initial cost.

Are performance and economy important in your community, as well as in Toledo? Read Centriline's 28-page illustrated bulletin—sent on request. Consult our hydraulic engineers now—before pumping costs go even higher.

CEMENT MORTAR LININGS FOR WATER MAINS CENTRIFUGALLY APPLIED in strict conformity with A. W. W. A. Specifications.

CENTRILINE CORPORATION

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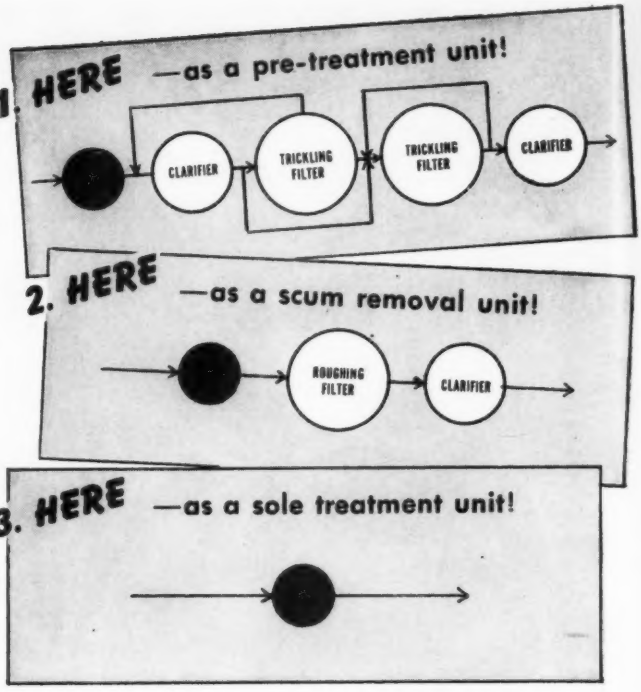
NEW YORK 6, N. Y.

CENTRILINE PROCESS

When you need special information—consult READERS' SERVICE DEPT. *on pages 65-69.*

in the sewage treatment flowsheet . . .

the DORRCO VACUATOR *fits*



Operating on the principle of vacuum flotation within an enclosed tank, the Dorrco Vacuator produces three separate products . . . scum and flotable solids . . . grit and settleable solids . . . an effluent. It can be used in the sewage treatment flowsheet to accomplish many results under widely varying conditions . . . of which the following three are typical.

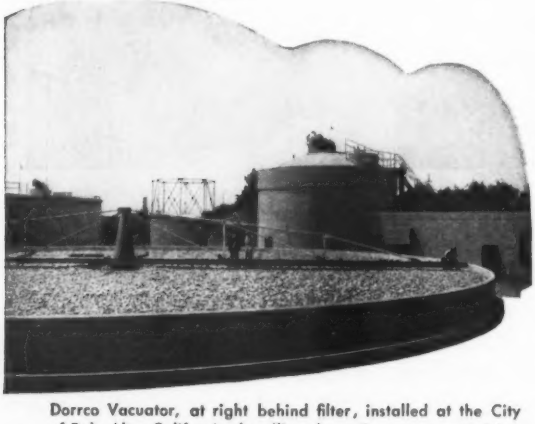
1. As a pre-treatment unit ahead of biologic treatment . . . either trickling filters or activated sludge . . . it will remove scum, grit and a substantial percentage of suspended solids in a single operation.

2. When seasonal loads of canning, packing house or other industrial waste create a scum problem, the Vacuator will relieve the overload, so that the Clarifier maintains satisfactory overall operation.

3. In coastal areas where partial treatment only is permissible, it will adequately remove visual or floating pollution.

With the Vacuator, suspended solids removal will average 40%—B.O.D. removal 25% or better. In *every* type of application the Vacuator will remove grit equalling the performance of the usual grit chamber. These facts are clearly documented by operating results from both municipal and pilot plant installations on all three applications.

A Dorr engineer will explain in detail the applications of the Dorrco Vacuator to your own problem.



Dorrco Vacuator, at right behind filter, installed at the City of Palo Alto, California, handling domestic sewage containing a heavy load of cannery waste. Average design flow, 3.0 M.G.D. . . . peak flow 6.0 M.G.D.
City Engineer: Fabian S. Miller.
Consulting Engineer: Harry N. Jenks, Palo Alto, California.
Contractor: Fred J. Early, Jr., Co., Inc., San Francisco, California.

DORR

RESEARCH ENGINEERING EQUIPMENT

DORRCO

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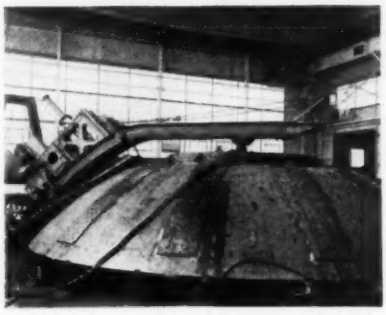
Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

When you need special information—consult **READERS' SERVICE DEPT.** *on pages 65-69.*

SURGE Tanks at Fort Peck

The bottom of the riser of one of the Fort Peck surge tanks is being welded to a saddle flange in this view. This saddle flange connects the riser pipe to the penstock.



A special machine, designed and built by CB&I is used to ream rivet holes in some of the bottom plates of one of the surge tanks.

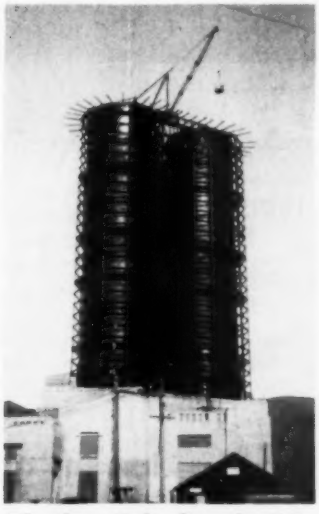
The bottom of one of the surge tanks is shown fitted up in the shop to check accuracy of fabrication before shipping.

. . . built to absorb momentum equal to that of a 45,000-ton Battleship under way!

And "under way" means that the battleship would be traveling about 20 m.p.h. The momentum these surge tanks absorb is caused by water flowing from behind the dam to the Fort Peck power house through a tunnel 5,667-ft. long. The use of surge tanks to absorb this force avoids excessive penstock pressures or any hydraulic instability resulting from a sudden change in the load on the turbines.

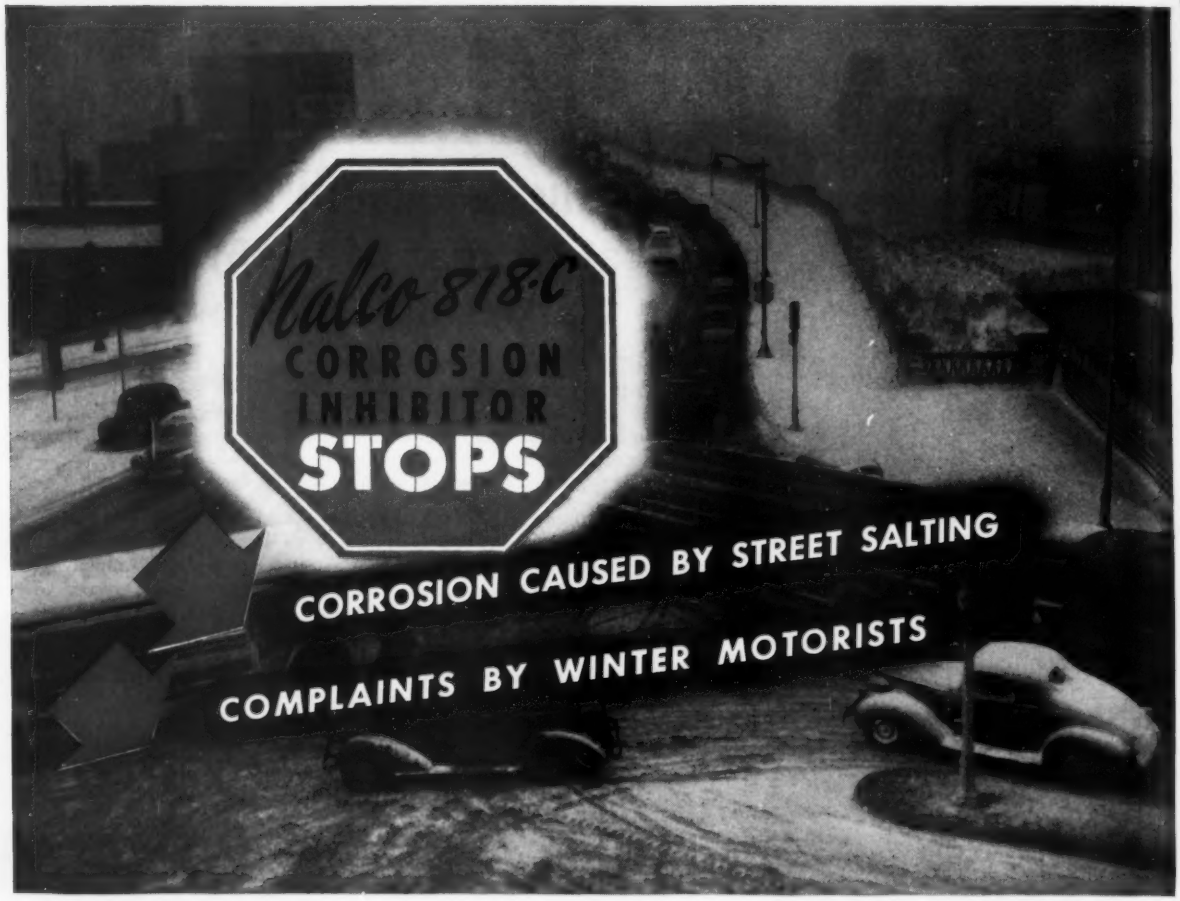
Strenuous service is only part of this surge tank story. Of even greater significance to you is the story of the building skill behind these tanks. Some of the story is brought to light in the accompanying illustrations. The rest—design, erection, and testing—is a record of cooperation with U. S. Engineers. Significantly, model and field test studies proved that the basic design and fabricating methods were sound.

The surge tank installation at Fort Peck is a dramatic testimonial of ability of CB&I to build steel plate structures for many engineering applications. We also furnished steel plate tunnel liners, penstocks and other complicated steel plate connections at Fort Peck. The same skill, the same facilities we used for this project are available to help you. Simply write our nearest office for details and quotations.



The three 40-ft. diam. by 150-ft. high "giants" were erected adjacent to the Power house.

View of the Fort Peck surge tanks showing the enclosure almost completed.



International News Photo

Nalco 818•C CHARACTERISTICS

- **Prevents Corrosion** by coating metallic surfaces with a microscopic film, impervious to brine.
- **Non-Toxic** Nalco 818•C offers no hazards to humans or animals.
- **Odorless.**
- **Economical** to use in heaviest snowfall areas... only one pound of low-cost Nalco 818•C needed for every 100 pounds of salt!
- **Efficient,** lasting corrosion-inhibitor action lasts as long as the brine on roads and streets.
- **Colorless** – Nalco 818•C will not harm paint, shoes or clothing.

WHILE salt is practically the perfect ice and snow elimination material, many cities have not used it because of the damage to automobiles, sewer gratings and piping caused by brine corrosion. Now, Nalco 818•C Corrosion Inhibitor effectively removes this objection—allows adequate ice control with salt while eliminating salt brine's corrosive effects.

In one city where *no* salt was used last winter, test panels mounted on buses and city vehicles showed *more* corrosion than similar panels in Rochester, New York, where 12,000 tons of salt were used—all corrosion-inhibited with Nalco 818•C!

Two Nalco Bulletins on Nalco 818•C are available: Bulletin 44 fully describes the results achieved in Rochester, New York; Bulletin 45 gives technical data for evaluating benefits of corrosion inhibitors with roadway salt. Your copies will be sent promptly on request.

NATIONAL ALUMINATE CORPORATION
6198 West 66th Place • Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem, Limited, Burlington, Ontario, Canada

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HOME SEWAGE DISPOSAL

Pressure of work has prevented me from writing you sooner regarding the review of my bulletin which you published in the May issue of PUBLIC WORKS. The manner in which you treated the material was a source of much gratification and I was simply deluged with requests for the bulletin as a result of the article. Copies had to be mailed out like hotcakes. I am considering now expanding this bulletin better to meet the needs for information on this subject.

John E. Kiker, Jr.,
Prof. of Public Health Engrg., University of Florida.

THE MSC AGAIN

I am a reserve officer in the Medical Service Corps, a sanitary engineer by profession and commanded a malaria control unit during the war. Since my transfer from active duty to the reserve I have been unable to find any place where I fit into the military picture. Nothing has been done to provide training or even appropriate correspondence courses for sanitary engineers or other types of professional specialists in the AMS-Res. I will soon be placed in the inactive reserve unless I can find some type of training to take, but I do not want to take the kind of training that has no bearing on my profession and would not enable me to be of more service to the Army.

AMS-Res. Officer.

(You are telling me? Ed.)

AND THE CORPS OF ENGINEERS

After much discussion of our wartime experiences in the Corps of Engineers, a group of us have reached the conclusion that the Corps of Engineers needs an Administrative Corps, similar to that in the Medical Department. These EAC officers could do the non-professional jobs, as adjutant, personnel adjutant, supply officer, motor officer, etc., for which engineering training is not required. Many individuals without engineering training would be satis-

When you need special information—consult **READERS' SERVICE DEPT.** *on pages 65-69.*

factory as company commanders, which they could do as well with the "A" affixed to the engineer insignia. Our basic idea is that only engineers should be engineer officers and no qualified engineer should be required to serve in an enlisted grade. The wastage of qualified engineering skills during the recent war, I know from personal experience in my own unit, was tremendous. A Consulting Engineer

(Check, and double-check! Ed.)

RESERVE OFFICER TRAINING

It was most interesting to read your editorial "Reserve Officer Retirement" on page 7 of the September issue of Public Works and especially the sentence "Under present training policies and programs, many reserve officers found it difficult to maintain an active status."

For those of your readers who want to take an active part in the Reserve, may I point out that the Corps of Engineers, throughout the country, and especially in New York State, has a very active and interesting program in progress in TO/E units of the several categories.

The 326th Engineer Combat Group which draws its personnel chiefly from the upper part of New York City and the lower part of New York State above the city line, has TO/E vacancies for several qualified officers and a good many enlisted men.

Therefore, if any officer or enlisted man considers himself qualified for assignment to any type of engineer unit, it is suggested that he contact this headquarters.

There are presently assigned to this Command, Engineer Combat Battalions, Engineer Aviation Battalions, a panel bridge company and a Carbon Dioxide Detachment. However, other types of engineer units are available so that if a particular individual does not qualify for assignment to the types available in the 326th Group, it is quite likely that they could be directed to a type of active unit for which they do qualify and which would be conveniently located for them.

At present, the units of this Command meet weekly and are paid a day's pay for each of 24 drills per year. They, of course, receive retirement credit for all drills attended regardless of whether a particular drill is a "pay drill" or not.

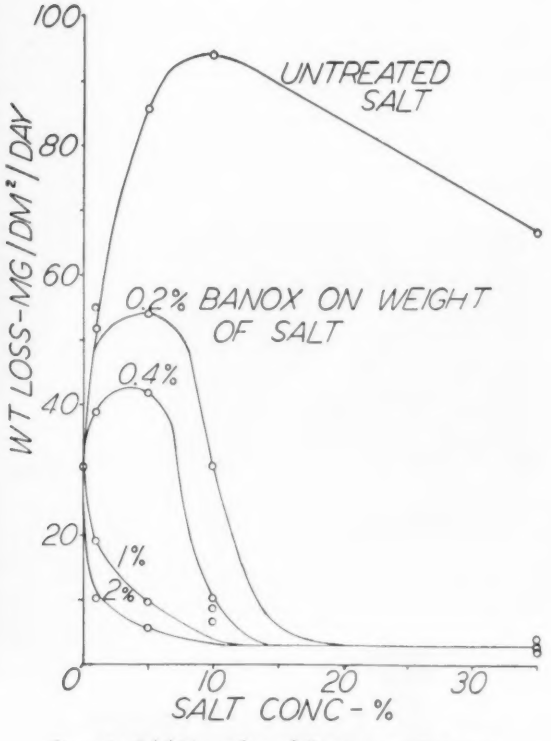
THOMAS P. BROWNE
Colonel, C. E., Res., Commanding,
326th Engineer Combat Group
260 East 161st St.,
New York, N. Y.

Field . . . or Laboratory

—tests show that Banox* stops salt-slush corrosion

Photograph above shows how the field test panels were carried on the front fender braces of police cars.

LAST winter—the first year in which Banox was offered as a corrosion inhibitor for use with salt for snow removal—approximately 50 communities used Banox, either experimentally or for the treatment of a major portion of their de-icing salt. Motorists complaints were absent, results were uniformly favorable, even in cases where the percentage of Banox premixed with the salt was erratic or considerably below the recommended proportions. To supplement the field tests, additional laboratory tests were conducted, using varied salt concentrations and different proportions of Banox and salt. Results of these tests are shown by the curves below.



Corrosion-inhibiting effect of Banox in various concentrations. As the curve shows, a 1% or higher concentration of Banox virtually eliminates metal corrosion in sodium chloride brines.

Full information on results obtained by using Banox with de-icing salt will be sent on request. Use Banox in your community this winter and enjoy the benefits of salt without the complaints.

*T.M. Reg. U.S. Pat. Off.

When you need special information—consult **READERS' SERVICE DEPT.** *on pages 65-69.*

ALL MAJOR PUMP PARTS OF

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VERTICAL TURBINE PUMPS

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- **BUILT TOGETHER**
- **TO WORK TOGETHER**

A. O. SMITH—one of America's oldest and largest fabricators of quality steel products—is the *only* vertical turbine pump manufacturer that gives you this important advantage of *undivided responsibility.*

This is your assurance . . . and your customer's . . . of unsurpassed quality control, precision fitting, and years of dependable, low-cost service.

STEEL WHERE STEEL BELONGS. A. O. Smith Pump discharge-head assemblies are heavy steel plate, formed and welded into the strongest, most compact design. Driver support is rigid, vibrationless, yet easily accessible. The precision-machined bowls are heavy cast iron. Impellers, of bronze, are semi-open or enclosed.

WIDEST ADAPTABILITY. A. O. Smith Pumps are available with Vertical Hollow Shaft Electric Motors, flat pulley or V-belt pulley, and right-angle gear drive. Water or oil lubrication.

Seventy-five years of experience are back of the research and engineering A. O. Smith has built into their pumps . . . to give you a superiority you can *depend on* under the toughest operating conditions.

Send the coupon—today.

Write or wire for full details of the A. O. Smith Vertical Turbine Pump distributor's franchise. Send the coupon for our colorful illustrated bulletin.

A.O.Smith

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Philadelphia 3 • Seattle 1 • San Francisco 4
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Milwaukee 1, Wisconsin

Without obligation, send us your new illustrated descriptive bulletin on A. O. Smith Vertical Turbine Pumps.

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Street or Route_____ Box_____

City_____ State_____

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KEEP TRAFFIC MOVING EVERY DAY THIS WINTER AT ½ THE COST

Change from Outmoded Abrasive Chemical Methods Get "Bare-Pavement" Maintenance With STERLING Auger-Action ROCK SALT

ACTUAL COSTS OF PROTECTING ICY HIGHWAYS WITH TREATED SAND OR STRAIGHT ROCK SALT

Obtained from F. Ray Williams, Supt. of Highways, Saratoga County, N.Y.

SAND MIXED WITH ROCK SALT:

Royalty	$ .10
Loading	.25
Haul, 5 miles at 8¢	.40
Piling with bulldozer	.15
Treating with salt at 50 lbs. per cu. yd.	.48
Reloading at time of storm	.25
Average haul, 10 miles at 8¢	.80
Spread	.10
Total cost per cu. yd.	$ 2.53
Use of 3 cu. yd. per mile at $2.53	7.59

STRAIGHT ROCK SALT:

CC Grade Rock Salt: (400 lb. per mile, computed for 5-ton load)	
5 tons of bulk salt at $12.95 per ton	$64.75
Loading, 5 tons at 25¢ per ton	1.25
Average haul (30 miles at 8¢ per ton-mile) 5 tons	12.00
Spread (mechanical) 5 tons at $1.00	5.00
	$83.00
$83.00/5 ton per ton =	16.60
$83.00/25 miles per mile =	3.32

UNIT SAVINGS:

$7.59 cost per mile with treated sand

3.32 cost per mile with Sterling Rock Salt

$4.27 SAVING PER MILE EACH ICING IN FAVOR OF ROCK SALT

Mileage of state highways in Saratoga County, N. Y. = 216 miles

ESTIMATED SAVING EACH STORM = 216 x $4.27 = $922.32

SAFE

Sterling *Auger-Action* Rock Salt will not harm black top or brick pavements. NOR WILL IT HARM CONCRETE SLAB FOUR OR MORE YEARS OLD, NOR AIR-ENTRAINED CEMENT.*

**Authority: Portland Cement Association*

FAST

One truck of Sterling *Auger-Action* Rock Salt will cover 10-15 miles before reloading. One truck with abrasives will cover only 1½ miles before reloading. THUS SALT IS APPLIED IN 1/10th THE TIME OF ABRASIVES.

EASY

Sterling *Auger-Action* Rock Salt is easy to store. It can be used in any mechanical spreader. No vari-sized chunks. No freezing. LEAVES NO RESIDUE TO BE CLEARED FROM ROADS AND SEWERS!

ORDER STERLING AUGER ACTION ROCK SALT NOW!

Comes in carloads, bulk, and handy 100-lb. bags.

INTERNATIONAL SALT COMPANY, INC.

SCRANTON, PA.

When you need special information—consult **READERS' SERVICE DEPT.** *on pages 65-69.*

PUBLIC WORKS MAGAZINE

NOVEMBER 1949 VOLUME 80 • NO. 11

● *"THE new distributor . . . resulted in much greater efficiency of overall operation."*

HOW ASPHALT SEALING REDUCES STREET MAINTENANCE COSTS

GEO J. FISHER
Superintendent of Streets, Wichita, Kansas

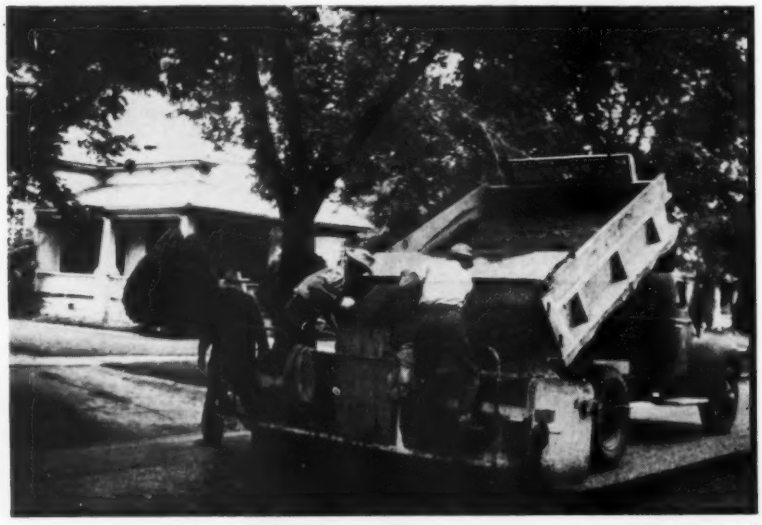
USING asphalt and chats the City of Wichita, in 1943, started a program of sealing its asphaltic pavements. Many of the asphalt pavements in the city were old and cracking badly. Much of the asphalt had lost its life. There were open cracks so that water was seeping under the asphalt surface and causing an extraordinary amount of breaking up in the spring from frost action.

Because of these conditions, and to prevent further damage, the Street Maintenance Division of the City instituted a chatting program in the summer of 1943. This program has continued since then at an average rate of approximately 250,000 square yards per year and the results have been outstanding. The patching of streets has been reduced appreciably and the necessity for reconstruction of many of the older streets has been postponed by this sealing program. The spring of 1949 was particularly bad because of the severe weather conditions during the preceding winter. Several

of the streets of Wichita withstood frost action admirably, simply because those streets had been sealed in 1948.

Steps in Treatment

The method of application of this treatment can best be described by enumerating the various steps and explaining each step:



● ***AGGREGATE or chat is distributed by mechanical spreaders fastened to rear of trucks; average application is 25 #/sq. yd.***

(1) Cleaning the Streets.—Before any sealing work is done, the Street Cleaning Division thoroughly cleans the gutters and asphaltic surface by sweeping and flushing. This process is done by the use of mechanical street sweepers and 1,500-gallon truck flushers. Occasional heavy deposits of dirt are taken up either by hand methods or by the use of graders which windrow this material. The windrowed material is then picked up by the use of mechanical hi-loaders and hauled away either to the dump or to people desiring fill dirt on their property. Immediately preceding the application of the asphalt, a hand sweeping crew again goes over the street and sweeps what dust and debris is on the street into the gutters. This is followed by the patching of any bad depressions and the removal of buckles or bumps.

(2) Applying the Asphalt.—The next step is the application of the hot asphalt to the cleaned asphalt surface. The City of Wichita uses a rapid-curing asphalt cutback RC-3, and approximately 0.25 gallon per square yard is applied by a 1000-gallon truck distributor. The application per square yard varies somewhat in accordance with the condition of the street. Those streets having nothing more than haircracks are given a lighter shot than those which are in a worse condition. The asphalt is heated to between 200° F. and 225° F. at the refinery and is loaded into the distributor truck at this temperature. The distributor truck is insulated and very little heat is lost between the refinery and the street. Of course, the truck distributor has a heating mechanism by which the asphalt can be reheated if necessary.

● ***ROLLING IS an essential part of the work and follows aggregate application closely. This view shows a Huber 10-ton roller.***

(3) Distributing Chat.—After the RC-3 is applied, the chat is distributed from trucks through a mechanical spreader box hooked on the rear of the trucks. Five trucks can supply sufficient chat to the 1000-gallon distributor if the haul does not exceed three miles one way. The average chat application is 25 pounds per square yard but this, too, varies with the amount of asphalt application. It never runs lower than 15 pounds per square yard and may increase to 30 pounds per square yard. That chat used is crushed limestone having a maximum size of one-half inch.

(4) Rolling. — Immediately after the distribution of the chat, the surface is continuously rolled by use of a 10-ton roller. As soon as the street has been thoroughly rolled, it is opened to traffic. Some controversy has existed as to whether a chatted street should be opened up immediately to traffic or allowed to stand three or four days without traffic. An experiment was tried on one of the streets by keeping it closed for over a week and it was found that this seal coat peeled off and was of little value. Therefore, it is recommended that traffic be turned onto the street immediately after rolling.

(5) Picking up and Throwing in Chat.—If the weather is particularly hot and if the traffic is particularly heavy on the street being sealed, it is necessary to throw chat back into the paths worn by the vehicles using the street. For some reason or other, vehicles will follow a path set by previous vehicles and these paths often wear down so that the appearance of "bleeding" occurs. To remedy this, a mechanical street sweeper is put on the street and the loose chat which gathers at the side and middle of the street is thrown back into these paths. After this has been done for three or four

RESURFACING OR SEALING WITH ASPHALT AND CHAT

Unit Costs and Work Done

	1946	1947	1948
Per Ton—Chat	$0.40	$0.45	$0.45
Per Ton—Freight	1.28	1.43	1.70
Per Ton—Unloading	0.25	0.30	0.25
Per Ton—Unit Cost	1.93	2.18	2.40
Per Gallon Road Oil	0.0627	0.069	0.0865
Gallons Road Oil Used	22,320	61,530	51,923
Tons of Chat Used	3,179	3,345.6	3,366
Sq. Yds. Streets Resurfaced	224,167	266,598	250,333
Aver. Cost Per Sq. Yd.	0.0495	0.0635	0.067

Labor, Equipment and Materials

	1946	1947	1948
Lbs. Chat per Sq. Yd.	28.36	25.1	26.9
Gals. Oil per Sq. Yd.	.099	.231	.207
Sq. Yd. Chat per 9 hr. day	8,005.9	9,695	9,272
Sq. Yds. picked-up per 9 hour day	—	7,110	19,080
Labor Hours	2,827.5	5,203	3,503
Labor Cost	—	$4,097.24	$3.123.18
Truck, spreader and sweeper days	—	263	196
Truck, spreader and sweeper cost	—	$683.80	$409.60
Dist., roller and high loader days	—	91	81
Dist., roller and high loader cost	$520.60	$455.00	$405.00

days, it is discontinued and the accumulated chat at the side of the street is picked up by the sweeper, loaded into trucks and, if not too dirty, re-used. If the picked up chat is too dirty to re-use, it is stock piled for filling holes in alleys and streets.

Labor and Equipment for the Work

(6) Labor and Equipment.—To do this job, it has been found that the following labor and equipment are sufficient for conditions in Wichita where the RC-3 is hauled directly from the refinery and where the chat is stockpiled early in the spring at the City Material Yard.

(a) Sweeping, patching, flagging and placing barricades—6 men. (b) Distributing RC-3 — 1 distributor with 2 operators (driver and operator. (c) Distributing chat—1 stone spreader with one operator and 2 helpers. (d) Rolling chat—1 10-ton roller and operator. (e) Hauling chat—5 trucks and drivers. (f) Cleaning streets—2 sweepers, 2 trucks and one high-lift loader with operators and drivers. (g) Loading chat at stock pile—1 belt type loader with operator. (h) Throwing in and picking up excess chat—From 1 to 3 sweepers, 1 to 3 trucks, and one high-lift loader with operator and drivers.

Results and Costs

The table herewith shows the results of resurfacing or sealing for the years of 1946, 1947 and 1948. In 1949 another 250,000 square yards of pavement will have been sealed in this manner, and a like program is set up for 1950. The table is self-explanatory but a couple of outstanding things should be noted.

(1) The cost per square yard for chatting in 1948 did not increase appreciably over 1947 in spite of increased costs of the chat and road oil. This was brought about by the purchase of a new distributor in 1948 which applied oil better and resulted in a much greater overall efficiency of operation.

(2) The square yards picked up per nine-hour day increased tremendously in 1948 over 1947 because of the fact that in 1948 a greater number of square yards were covered per day but less chat had to be picked up. Therefore, the same crews could cover more territory per day.

In 1947, an asphalt of the RC-4 grade was tried but it was found that the chat did not adhere nearly so well to this type of asphalt and much more of the loose chat had to be picked up. Apparently the RC-4 failed to rise up around the rock on top of it as well as the RC-3 did. Because of this fact, we went back to the use of RC-3 in 1948 and 1949.

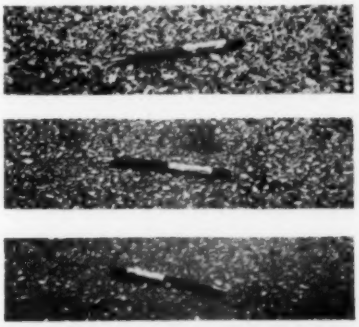
Surfacing Old Concrete

This type of surface sealing for asphalt pavements is highly recommended. It is a very cheap way of prolonging the life of this type of pavement and, in the long run, saves the taxpayers money—at least it defers for a while the agony of paying for a new pavement.

On one street in the city which has a concrete surface, something had to be done to hold this concrete surface for a period of two or three years until the State Highway Commission repaved it as part of the reconstruction of U.S. 54 through Wichita. It was planned to resurface this section of concrete pavement with hot asphaltic concrete at a cost of approximately $2.00 per square yard. However, it was decided to try a seal program in place of the hot asphalt. Before the asphalt and chat were applied, the pavement was shot with 0.15 gallon of MC-1 as a pre-seal. Sand was applied to this MC-1 and traffic was allowed to use it immediately. After several days, the chat treatment as described above, was applied and after this chat treatment had set for approximately two weeks, another similar chat treatment was given to this section of concrete pavement. This was all applied at a cost of 15 cents per square yard and this section of concrete pavement is still in good shape and will very definitely last until the Highway Department replaces it.

The maximum application of seal coat on asphalt for one day was accomplished on July 27, 1949. On this day, 21,000 square yards were applied. Normal applications run from 10,000 to 15,000 square yards per day.

The city has found that the resurfacing or sealing program is an economical way to secure and maintain smooth, water-tight , non-skid asphalt wearing surfaces. It is planned to continue sealing as part of the regular, annual street maintenance program. It must not be assumed that chatting will rid the streets of holes and other uneven places. It only seals the surface from water penetration and provides a better nonskid surface.



● ***THESE views show the finished surface at various stages. At the top, the appearance immediately after rolling; in the center after one week of service; and at the bottom, after a full year.***

● *PORTION of the 48-inch gunited and lined conduit before backfilling. Joints are being made; Link-Belt crane at right handled pipe.*

CEMENT LINING and GUNITING

NELSON F. PITTS
City Engineer, Syracuse, N. Y.

FOR some time Syracuse, N. Y., has been extending one of its main conduits between Skaneateles Lake, the source of the city water, and the city. The final section, completed last fall is 5,400 feet long and 48 inches in diameter. The type of design chosen for this line was new for Syracuse. The pipe is welded steel; the exterior is protected by a gunite coating over wire mesh; and the interior by a continuous centrifugally applied cement-mortar lining.

Before the selection of this new type of design, extensive studies were conducted to determine the type of completely protected pipe which would involve the least cost to the city. Of the types studied there were two promising possibilities. One was the use of a ⅜-inch thick, 48-inch welded steel pipe with coal tar enamel lining on the interior and a similar wrapped coating on the exterior. The second possibility was a 5/16-inch welded steel pipe with a continuous 3/16-inch centrifugally placed cement-mortar interior lining, and a 1-inch gunite coating over wire mesh on the exterior.

Of these two possibilities, city officials chose to use the cement lined interior-gunite coated exterior type of design.

Selection Factors

This procedure was adopted for several reasons: In the first place, it was considered necessary to wrap the pipe if a coal tar coating should be used, as the soil through which the line passes is rocky. The coating of enamel might be more subject to damage under our conditions than would the 1-inch, reinforced gunite coating. Second, a comparison of costs for coal tar enamel protection and for applying a 3/16-inch mortar lining on the inside and a 1-inch layer of gunite on the outside, indicated a worthwhile saving in favor of the latter method. Third, the gunite coating and mortar lining provided additional structural strength which allowed the use of a pipe with a thinner wall than would otherwise have been possible. Finally, it was felt that a lining and coating of cement provided a maximum assurance of long life and continued effective service.

A 5/16-inch pipe wall thickness was found to be sufficient as far as structural strength was concerned but a ⅜-inch wall thickness was considered necessary if coal tar enamel protection had been used, allowing the 1/16 inch of steel for corrosion if and when the coating broke down. It was considered unnecessary to add this additional 1/16 inch of steel if a coating and lining composed of cement and aggregate were used. A further feature of the gunite coating and wall thickness of 5/16 inch was that this particular thickness for pipe of this diameter would theoretically stand a maximum negative pressure of about 14 pounds per square inch without collapsing. While it is unlikely that this conduit would be subjected to a near-perfect vacuum, it seemed advisable to provide extra thickness as a protection against collapse had the coal tar enamel lining and coating been used. In the case of the gunite exterior coating, the 1 inch of reinforced gunite would provide ample protection against this contingency in addition to providing excellent protection for the metal.

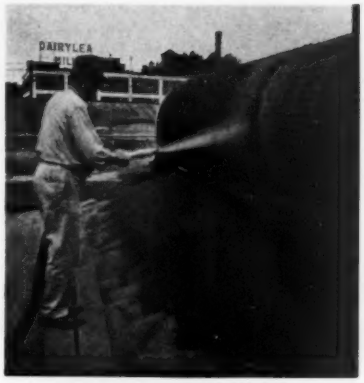
The steel pipe was ordered in early 1949 by the Water Division of the Department of Engineering of which Elon P. Stewart is Division Engineer. It was delivered by the Bethlehem Steel Company in July, 1948. The pipe was ordered in 30-foot lengths of welded steel, 5/16 inch thick and 49 inches outside diameter. With this particular outside diameter, the 5/16-inch wall thickness along with the 3/16-inch cement mortar lining, left exactly a 48-inch inside diameter conduit.

The gunite work was done by Water Division personnel, which has its own guniting equipment and is

experienced in this work. The Water Division shop, which is well supplied with equipment, used a Gantry crane which greatly facilitated handling of the pipe and specials during guniting.

The steel reinforcing for the exterior gunite coating was a 2-inch square No. 13 wire mesh. The wires which ran longitudinally with the pipe had been crimped at 4 inch intervals to attain a regular ⅜-inch spacing between the mesh and the surface of the pipe. By this means a very good coverage was obtained by the gunite on all sides of the mesh wire.

To provide suspension and rotation of a pipe length during the guniting operation, the pipe was cradled between two rollers at the edge of each end of the pipe. Power for rotation was supplied by a gasoline engine coupled through a gear reduction to both of the rollers on one end of the pipe. The pipe was rotated about 1 rpm during the application of gunite.



● ***GUNITING the pipe line; rebound sand is shown in pile under pipe.***

the ground so that the rebound could drop harmlessly out of the way and did not interfere with the continuous application.

Before application of the gunite, loose mill scale and loose foreign material were removed. However, it was believed unnecessary to be too particular beyond this degree of cleaning.

After solving early problems, one nozzleman on a gunite machine could coat four 30-foot lengths per day. The 1 rpm rotation of the pipe allowed uninterrupted application of gunite.

In order to provide for later installation of Dresser couplings it was necessary to omit the gunite coating about 9 inches back from each edge of the pipe. At this point, an ordinary garden hose was put around the pipe and the two ends butted together. This provided an accurate shoulder for the gunite. After the gunite was completed the hose was used as a guide for a hand trowel in trimming about 3 inches back from the hose to form a true cylinder for the coupling installation.

The completed pipe, each section weighing about 5 tons, was then picked up by a crane and placed on two rails, which supported it on each end. In this position it was cured. The spiders which retained the shape of the pipe were left in position until the gunite mortar had set. The gunite was kept wet by spraying with water at about 30-minute intervals. During the day this was done by yard personnel and at night by the watchman.

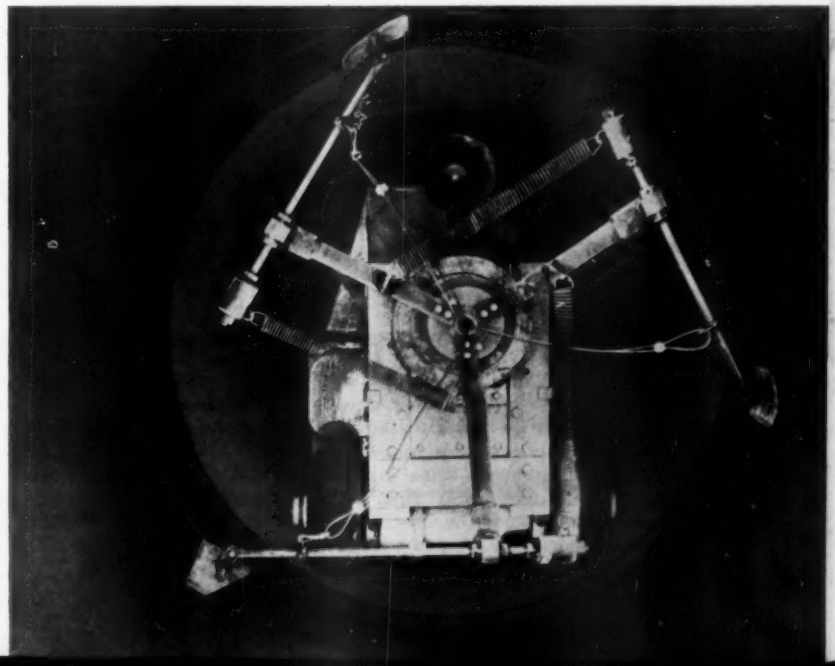
The pipe was handled with no particular difficulty. It was hauled to the job site on flatbed trucks, one or two lengths at a time.

A WATER MAIN for LONGER LIFE

To prevent excessive flexing of the pipe during gunite application and handling and also to maintain a round pipe while the gunite was curing, Water Division personnel had made a number of 4-spoked "spiders." These consisted of four short lengths of iron water pipe with a cross fitting as the hub. Three of these four lengths radiated 24 3/16 inches from the center. The fourth was a shorter length into which a trench jack was placed to allow adjustment into place once the spider was in the pipe. The illustration shows two of these spiders set 45° apart.

One part cement to four parts of sand were used for the gunite material. It was applied with a minimum of water in order to get a dense mortar. Experience in the application of gunite has proved that a considerable amount of rebound is a necessary result of a good guniting job. In this case it is estimated that about 40% of the sand dropped away from the pipe as rebound leaving a very dense mortar of nearly one part cement to two parts of sand. The rotating pipe was suspended far enough above

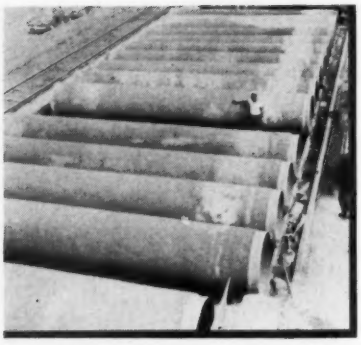
● ***HEAD-ON view of lining machine, showing trowels which insure smooth lining with long service life.***



In laying the pipe a 1½ yard rented dragline was used for trench excavation. A 1¼-yard shovel crane was used for laying the pipe and an A-C tractor equipped with a bulldozer was used for backfilling. Both of these pieces of equipment are city owned.

The Dresser couplings used to connect the sections of pipe were encased in cement-mortar cast in a special form. Since six lengths of

● ***REDUCING branch gunited; it was afterward lined in place.***



● ***PIPES that have been gunited are stored for curing.***

● ***SPIDERS were placed in the pipe to insure roundness.***

● ***JOINT form in place for pouring mortar around couplings.***

pipe were laid per day, six forms were necessary to carry on uninterrupted operation. These forms were made to fit reasonably well to the pipe and to provide a minimum of one inch of mortar on the couplings. The form was made in two halves, hinged together to provide easy installation and removal. A mortar which poured reasonably well was used and no trouble was experienced with air voids or imperfections in the completed encasement. In order to provide better curing conditions and less rapid temperature changes, the pipe was backfilled immediately after the forms were removed. Minimum of backfill of 3 to 4 feet was used. No particular care was deemed necessary in placing the backfill.

After the pipe was completely backfilled the internal cement-mortar lining was placed by the Centriline Corporation of New York. The 3/16 inch lining was applied by the centrifugal process to insure a strong and jointless coating. A very dense dry mix was used, consisting of 6 parts of screened and dried sand, 5 parts of Portland cement (ASTM C150-44, Type 2) and 1 part of natural cement. The mix was carefully controlled to obtain uniform standards. It was premixed for five minutes before entering the pipe.

The lining material was transported up to 1,000 feet from an opening to the place where the lining machine was operating. A power-driven buggy carrying a mixer load of mortar shuttled between the lining machine and the opening where the mixer was supplying the mortar.

The mortar was fed into the lining machine hopper from which it was carried at a constant rate to the center of the rapidly rotating head and from there it was thrown by centrifugal force evenly to the wall of the pipe. The machine traveled through the pipe at constant rate of speed, resulting in a uniform thickness of lining. Application was followed immediately by a series of rotating trowels which brought the new lining to a relatively smooth jointless surface. Once placed, care was taken to be sure the mortar lining remained wet so that proper curing could be accomplished. For the most part this was accomplished by filling the completed section.

The Centriline Corporation started work on November 6, 1948, began lining operations on November 6, completed lining on November 16 and moved off the completed job on November 24.

It is expected that the centrifugally placed lining will entirely prevent tuberculation and that the pipe will never need cleaning. Recent flow tests on this section of line show that Williams & Hazen Coefficient "C" to be 143. The capacity of the entire conduit system, with the new section in service, is nearly 52 mgd.

Three-Lane Traffic on a City Street

A pavement width of about 60 ft. is available on Main St., Lewiston, Ida., between 11th and 18th Sts. This is not quite wide enough to accommodate four lanes of traffic with parking on both sides of the street; and it is too wide to channel properly two lanes of traffic; it is not possible for one car to pass another traveling in the same direction without crossing the centerline. It was decided to try a 3-lane layout in spite of the fact that all traffic authorities advise against this practice. The 3-lane channelization has proved very satisfactory during its first year of use, according to W. P. Hughes, City Engineer, and has not been a hazard.

Pedestrian lanes, formerly marked with yellow traffic paint, required painting twice a year and did not show up well at night. About 2,000 Armor-Flex markers were installed. These have been very successful except that there was a rather large loss of markers during the winter months because of tire chains.

Spraying Roadside Trees

Last spring the road commissioners of Wayne Co., Michigan, sprayed the trees along 25 miles of roadsides for the control of scale insects. A 6½ percent concentration of oil spray was used while the trees were still dormant. Spraying was also done to control the Pine Shoot Moth. A solution containing 3 pounds of 50 percent D.D.T. and one pint of nicotine sulphate in 100 gallons of water was used for two sprayings, 10 days apart. The same mixture was used for several trees on Lake Shore Drive that were nearly defoliated by an infestation of Leaf Hopper. Some spraying was also done on East Outer Drive for Tussock Moth using a 3 percent solution of 50 percent wettable D.D.T. powder.

Soil Mechanics Short Course

A soil mechanics and foundations short course will be held at Pennsylvania State College, State College, Pa., Jan. 30 to Feb. 10. The course is designed for those having some previous knowledge of mechanics and strength of materials. There are 40 hours of lectures and 40 hours of laboratory. For further information write Miss Mary I. Fleming, Central Extension, Pennsylvania State College, State College, Pa.

TEN YEARS TO BUILD A 20 MILE DRAINAGE DITCH

ARTHUR F. BUERKLE
Surveyor, Tippecanoe Co., Ind.

TO THE writer, the construction of the Kellerman-Leaming Drainage Ditch in Tippecanoe and Montgomery Counties, was a dream come true. After 10 years of delay and litigation, the work was completed, though visualized as necessary from the start.

This ditch was built originally as the Lofland drain, to avoid litigation; although some 1,500 acres in Montgomery County were served, none of the land was originally assessed. In 1939, a petition was prepared for construction of the East Lateral by the Civilian Conservation Corps, but before assessment data could be worked up, CCC was transferred to Army work. At about the same time a petition was introduced in neighboring Montgomery County for constructing a section of the project; but a part of this and some of the contributing acreage were in Tippecanoe County. Indiana law provides that when a drainage ditch enters another county, the Surveyor of that county shall be one of the viewers.

Another project had then to be petitioned for after favorable action by the viewers, who reported the project favorably. The engineering and design problems were assigned to the writer. A preliminary survey showed that 20.5 miles of open main and branch ditches would be included in the project and that the cost of engineering work alone would be $2,500. At this point, the war intervened; engineers became so scarce that only routine necessary work could be done.

However, design work began again in 1943; engineering data were compiled; and proportional benefits were determined. Initially assessments were made on the flat acre basis of determining benefits, but this was disputed and carried to court, the project again being thrown into litigation. A compromise was finally reached to calculate assessments—aside from about 72 acres requiring clearing, which were to be assessed against the owners—on the following basis: Land within one-half mile of the drainage ditch to be assessed on a 100% basis; land one-half to two miles distant from the ditch to be assessed on a 90% basis; and land more than two miles distant to be assessed at 80%.

● ***DRAGLINE at work is shown in the lower picture. At top is type of private bridge constructed over main ditch.***

Arthur F. Buerkle, Surveyor of Tippecanoe County, Ind.

This compromise was accepted and confirmed in 1947. Estimated quantities were: Clearing 71.75 acres; excavation and leveling, 267,377 cu. yds.; and some incidental work. In all, 12,447.5 acres in Tippecanoe County and 12,332.2 acres in Montgomery County were included; also 7 miles of Village streets; 11 miles of State Highway right-of-way; 51 miles of county highways; and 14 miles of railroad trackage.

Ditch bottom widths varied from 30 ft. at the lower end to 4 ft. at the upper ends; bank slopes were one and a half on one. The contract for construction was awarded to William E. Allen of Hillsboro, Ind., the low bidder, for $49,779. Three other bids were below the estimate. Work was started in November, using a Link-Belt 2-yd. diesel dragline. The winter, though not unusually severe, stopped work with smaller machines and slowed down the large dragline. In the spring, a Unit ¾-yd. machine was also put to work. In addition, International Harvester and Caterpillar bulldozer units were employed. With these in service, the work was finally completed—a dream come true after 10 years.

SEWAGE TREATMENT

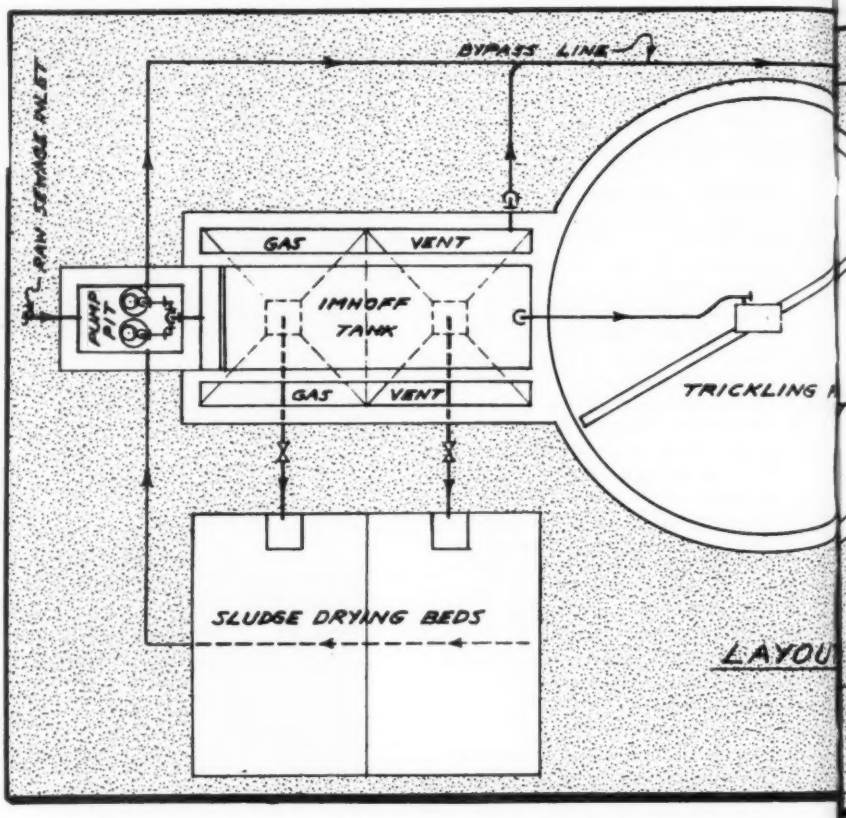
ROBERT T. RICHEY
Sanitary Engineer, Shaw, Metz and Dolio, Arch. & Engrs., Chicago, Illinois

EXPANSION of housing facilities was recently started by a large industrial firm for its employees at a plant located in the desert area of a western state where 20-degree below zero operating temperatures will exist. The sewage from the existing establishment, consisting of 16 one-family housing units, a hospital, a hotel, and kitchen facilities for feeding workers has previously been discharged into a septic tank of questionable capacity. Delivery of the sewage to this septic tank is through an 8" vitrified clay sewer laid with the slope of the terrain, approximately 3%, toward the septic tank location. The new housing location will consist of 12 four-family units and 1 two-family unit, or provisions for 50 families; 5 of the four-family units will not be built at this time, but the future sewage contribution from this source was considered in the design of the treatment plant.

Bases of Design

Based on the population currently housed, combined with the sewage load from the other existing sources, it is expected that the eventual maximum population equivalent for the entire installation will be 300 persons. Assuming 100 gallons per capita per day, the treatment plant design flow is 30,000 gpd. The estimated 5-day BOD of the raw sewage to be treated was assumed, for design purposes, to be 200 ppm. The officials of the industrial firm stated that no wastes from their processes would be discharged into the sanitary sewer system, and although such statements cannot be accepted as a definite promise, such wastes in this instance would contain only inert, inorganic material that will not materially increase the organic load on the sewage plant. No storm water drainage enters the sewerage system.

Since the new lateral collector sewers must run approximately 900 feet parallel to the contours, the outlet invert of each line is too low to permit discharge directly into the existing outfall sewer; therefore, a new branch sewer collects the sewage from the new housing area only, and then ties into the existing line at an appropriate existing manhole.



● *LAYOUT of small sewage treatment plant, showing Imhoff tank preceded by pumps, trickling filter and sludge drying beds.*

That portion of the present line from this manhole to the septic tank is being abandoned and an 8" vitrified clay line is laid to the new sewage treatment plant.

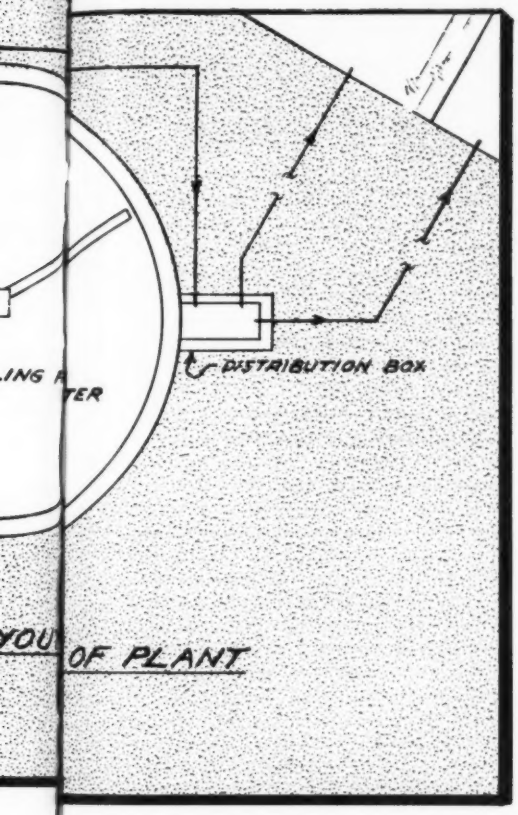
Pumping and Sedimentation

The treatment plant is of reinforced concrete, with the units approximately half below grade. The raw sewage enters a hopper-type pump sump, the bottom of the sump being 3'0" below the invert of the raw sewage inlet, and is lifted a vertical distance of 14'6" by a Yeomans duplex non-clog sewage ejector, each pump capable of handling a flow of 50 gpm. at a total head of 15 feet. The pump units are arranged for both alternate and combined operation, up to 100 gpm., should the normal flow be exceeded. The motor characteristics are 1 hp., 1150 rpm., 3-phase, 440 volts. From each pump unit a 4" cast iron line with a check valve and a gate valve ties into a common primary influent header of 4" cast iron. A scuttle-type cover provides protection for the motor controls and switches, which are floor-mounted on the 6'0" x 4'0" metal motor floor at a point 6'0" above the bottom of the sump.

The primary influent header discharges into a concrete Imhoff tank which is 19'0" long, 10'0" wide (inside dimensions) and 15'2" deep overall. The settling compartment is 6'0" wide and 5'6" deep from the normal liquid level to the slot, providing a net capacity of 3,105 gallons and a retention period of 2.58 hours at design flow. The compartment walls, from a point 1'9" below liquid level, slope inward at a ratio of 5 vertical to 4 horizontal. The

DESIGN

Industrial Housing Expansion



point 18″ below the end of the slot overlap, provides a net capacity of 780 cubic feet or 2.6 cubic feet per capita equivalent. A gas vent 16″ wide is provided along each side of the settling compartment, the combined area being 26.6% of the gross sludge compartment area. The incoming raw sewage is deflected downward by a 24″ wide by 2″ thick wooden baffle extending across the settling compartment 14″ from the inlet end of the tank. The baffle projects equally above and below the normal liquid level. The inlet end of the Imhoff tank is a common wall with the pump pit, as shown in the section below.

Removal of the digested sludge is provided by two 6″ cast iron draw-off pipes supported by strap iron "spiders" at a point 8″ above the bottom of each hopper and extending through the tank wall at an angle of 60 degrees from the horizontal to 6″ above finished grade; this extension forming the vent and cleanout. The draw-off lines project horizontally from the cleanout extension line at a point 6'4″ below the liquid level of the tank. A few feet beyond the tank wall each draw-off line is equipped with a 6″ hub-end standard cast iron gate valve. To facilitate operation of the valves, each has an extension stem cased in 15″ vitrified clay pipe carried to 6″ above grade and provided with a wooden cover.

Design of the Trickling Filter

Secondary treatment consists of a 25'0″ diameter standard rate trickling filter with 7'0″ depth of media above the underdrain system. The media retaining wall is reinforced concrete, a portion of it being a common wall with the effluent end of the Imhoff tank. The filter unit was designed on the basis of 400 pounds of 5-day BOD per acre-foot. Applied BOD amounts to 33.5 lbs. per day, assuming 33% reduction in the Imhoff tank. At the design flow of 30,000 gpd., a 25.8' diameter filter is indicated; however, it was decided to reduce the diameter to 25'0″ in order to utilize a Yeomans "waterwheel" rotary distributor. The low head requirements of this distributor effected a substantial saving in initial cost. Dosing equipment, underground feed lines, or other complicated arrangements are not required.

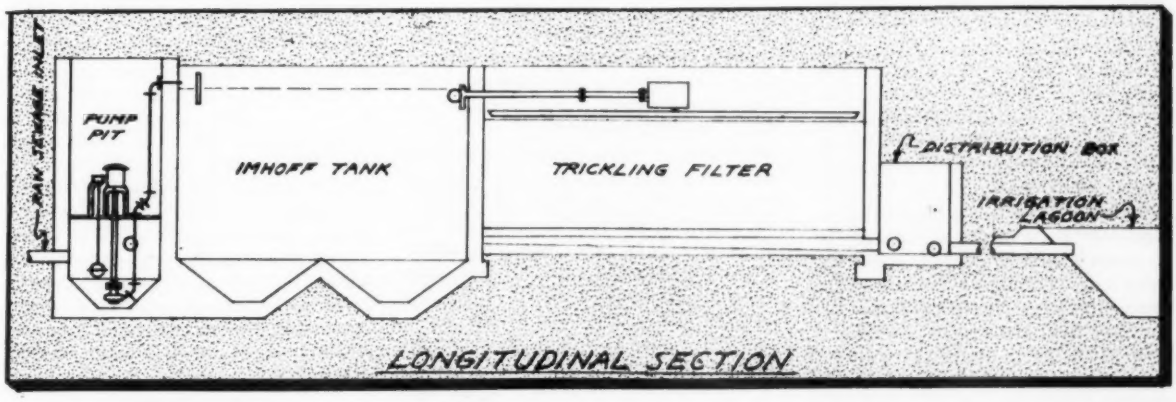
The following methods were used to compute filter design requirements for the plant described here:

0.03 (mgd. flow) x 8.34 (lbs./mg.) x 200 (assumed BOD of raw sewage) x 0.67 (% of applied BOD after primary treatment) amounts to 33.5 lbs. BOD applied to the filter per day. Media required =

$$\frac{33.5 \times 43{,}560 \text{ (sq. ft./acre)}}{400 \text{ (lbs. BOD load/acre ft.)}} =$$

3,648 cu. ft; and with 7' media depth, area is 3,648 ÷ 7, or

● ***SECTION through the plant, including the pump sump, the settling tank, the trickling filter and distribution box.***



slot is 8″ across and one compartment wall makes an effective slot overlap of 6″. The sludge digestion compartment is 19'6″ x 10'0″, with two hoppers 9'6″ x 10'0″ x 2'8″ deep. The hopper sides slope to a 2'0″ square bottom. The sludge compartment, calculated as beginning at a

521 sq. ft., giving a filter diameter of 25.8 ft.

The filter media consists of approximately 135 cu. yards of stone crushed to pass through a 4″ screen but be retained on a 2″ screen with a 5% allowable variation either way. The filtrate is collected by 454 sq. ft. of vitrified tile filter underdrain blocks and discharged through a filtrate drainage channel into a 4'8″ x 2'0″ outfall distribution box, the channel being provided with an 8″ cast iron shear gate for use in flooding. The filter unit is to be covered with a wooden structure, which will provide some protection during low temperature operation.

Final Disposal

Due to the fact that there are no continuously flowing streams in this desert area, the children from the housing project may look upon the effluent "stream" as a novelty and be tempted to play in the water; therefore, the final effluent will be disposed of by lagooning, the lagoons being surrounded by protective "cyclone" fencing. The recommendation of the writer, that the lagooning be preceded by settling of the filter effluent, was disapproved because of initial cost.

Percolation tests made at the proposed site indicated that the soil of the area would absorb clear water at an average rate of 3″ per hour or 1.875 gallons per square foot per hour. Based on the sub-surface drainage recommendations of the U. S. Public Health Service ("Individual Sewage Disposal Systems," Joint Committee on Rural Sanitation, Re-print #2641, U. S. Public Health Service), it was determined that the requirements would be 28 sq. ft. per person, or 8,400 sq. ft. In view of the fact that final settling of the filter effluent is omitted, the net area was increased to 10,000 sq. ft. to provide a safety factor. In accordance with standard procedure, two lagoons, each 100′ x 100′, are included, dosing to be alternated as required; alternating periods are to be determined by actual operating conditions. Dosing is calculated at approximately 130,000 gallons per acre per day. Control of the flow is by 8″ shear gates set in the walls of the outfall distribution box and discharging into two 8″ vitrified tile dosing lines, one to each lagoon. The lagoons are 4 0″ deep and separated by a 2″ wooden dividing wall extending 12″ below the lagoon bed; the dividing wall is braced with wooden stakes.

In using the lagoon method of disposal, it was borne in mind that the water supply must not be endangered; the lagoons are approximately 2400 feet downgrade from the well and the well log indicates protective impervious strata above the water bearing sands.

Sludge Disposal

The disposal of digested sludge from the Imhoff tank will be facilitated by two standard-type sludge drying beds, one for each sludge hopper. Each bed is 15'0″ x 10'0″, with 6″ of graded gravel, 1½″ size around the underdrains to ¼″ at the underside of the sand layer, which consists of 6″ of clean, washed filter sand. The beds are separated by a 2″ wooden dividing wall extending 6″ above and below the surface of the beds. Concrete splash blocks 2 feet square and 3″ thick, are provided below each sludge inlet pipe. The sludge filtrate is collected in 4″ open-joint vitrified tile collector lines located below the short axis of each bed. The two collector lines form a common header line beyond the beds, and carry the filtrate through a 4″ closed vitrified tile return line to the raw sewage sump. The underdrains and return line are pitched ¼″ per foot.

Above the raw sewage inlet to the pump pit is an 8″ vitrified tile bypass opening, which will automatically bypass the raw sewage in event of a power failure or pump stoppage. This bypass line discharges into the distribution box at the effluent end of the filter. At the end of the Imhoff tank is an 8″ emergency bypass outlet controlled by an 8″ shear gate; this line drops to 4′-0″ below grade and joins the raw sewage bypass. Bypasses provide flexibility of operation, but should be resorted to only when necessary.

An interesting item to be considered in this plant is the effect of sub-zero temperatures on the lagoon disposal units. Since there is no secondary settling period to reduce the temperature of the filter effluent, it is expected that the sewage will be applied to the lagoons at a comparatively normal temperature. Though the surface may freeze, it is believed that the lagoons will continue to operate satisfactorily.

Flocculation Increases Settling Efficiency

River conditions became critical in the summer of 1948, and the Minneapolis-St. Paul Sanitary District initiated plain flocculation or pre-aeration by air agitation of sewage, without chemicals, in the east half of the treatment plant, leaving the west half in operation by plain sedimentation. During eight full days of operation, the flocculation process increased suspended solids removal from an average of 76.5% (for that portion of the plant with no flocculation) to an average of 80.5%. In the same manner, the removal of BOD was increased from an average of 43.7% to an average of 49.4%; and the removal of settleable solids was increased from 97.9% to 99.0%. During this period the strength of the incoming raw sewage, after screening and grit removal, was 226 ppm of suspended solids and 173 ppm of BOD. Detention in the flocculation tank averaged 25 minutes and in the settling tanks 2.1 hours. The quantity of air used average 1.5 cu. ft. per minute per foot of tank of 0.02 cu. ft. per gallon of sewage.

Centralizes All Traffic Functions

Los Angeles has created a traffic engineering department which will take over the administration of traffic matters now distributed among nine city departments and agencies. All work concerning movement of traffic will be centralized in the new department which will be headed by a director appointed by the mayor and which will have status equal to that of other city departments. This work includes technical studies and an analysis of factual data; operational project planning; research on driver and pedestrian characteristics and equipment development; review of design for traffic facilities; installation, operation, and maintenance of traffic control devices; review of requests for driveways, cabstands, and other matters relating to safety and efficiency of street use; and close cooperation with other departments and agencies whose secondary functions overlap or affect functions of the traffic department. The ordinance creating the department was adopted after a nine-month study by a traffic survey committee which submitted a report to the city council and mayor last December. *Public Management.*

Cost of Installing Water Services

On 141 new water services installed in Lewiston, Ida., during 1948-49, the average length of service was 38.8 ft., and the average cost $57.31 each, including labor, pipe and fittings and meter.

● *ADMINISTRATION Building, shown at left, has large glassed-in lobby and many conveniences.*

● *THE PARKING area and apron are surfaced with native iron ore and a seal coat. Runways are turf.*

JEFFERSON, TEXAS Builds an Airport

J. A. STARLING
County Judge

LOCATED above the floodplain of the Little and Big Cypress Rivers, on a tract of 113 acres, the Jefferson Airport is rated by CAA as Class I. It consists of 3 strips. The N-S strip is 2,100 ft. long; the NW-SE strip is 1,700 ft. long; and the NE-SW strip is 2,400 ft. long and can be extended to 3,600 ft. when needed. The typical runway section is 300 ft. wide with 1% transverse slopes, and the taxi-ways are 50 ft. wide. Approach zones are cleared of trees to meet CAA requirements of 20:1 glide angle straight ahead, with 7:1 side slopes from a point 250 ft. from the center of the strips. The airport is 2 miles east of Jefferson and takes its name—Cypress River Airport—from the two rivers near it.

The contract for clearing; grubbing; grading and drainage; flexible base and surfacing for the access road, parking area and apron; fencing; and boundary markers was awarded to H. L. Butler & Son of Dallas for $44,585.64. The contract for water and sewerage, turfing and seeding, and the administration building was awarded to H. R. Henderson & Co., Marshall, Tex., for $21,896.50. Items and bid prices are shown in the accompanying table.

Native iron ore material was used for the base of the access road, parking area and apron. Surfacing consisted of 0.25 gal. per sq. yd. of MC-1 prime coat and 0.3 gal. per sq. yd. of OA-135 seal coat covered with 20 lbs. per sq. yd. of gravel. A strip 100 ft. wide along the center of the runways is being turfed with Bermuda grass, and the rest of the graded area was seeded also with Bermuda. A temporary cover of winter oats was sowed to make the field usable and prevent erosion during the first winter.

The Administration Building is of the rustic type, with large oak beams and columns, a native rock fireplace and walls, and a rock terrace. It has a large lobby and observation room and the two sides facing the field are glassed in. It also has an office, display counter, storage space, kitchen, and dining and rest rooms. Hot and cold water are available and there is a cold water fountain in the lobby.

The project was sponsored by Marion County, acting through its Commissioners Court, consisting of Judge J. A. Starling and Commissioners J. R. Wimberly, C. G. Schillinger, H. D. Carter, and Cleo McKinley. The Civil Aeronautics Administration shared 50% of the cost. It was represented by F. J. Schnitzer, district airport engineer; Carl Kneutz, district field engineer; Gordon Jones, agronomist; and A. L. Witt, architect.

UNIT PRICES ON CYPRESS RIVER AIRPORT

Item	*Quantity*	*Unit*	*Unit Price*
Clearing	29.1	Acre	$100.00
Clearing & Grubbing	10.4	Acre	300.00
Excavation	62,888	Cu. Yd.	.45
Flexible base	1,552	Cu. Yd.	3.00
Prime Coat	2,940	Gal.	.16
Seal Coat	2,949	Gal.	.16
Aggregate	98	Ton	7.00
Boundary Markers	48	each	20.00
Fencing	2,930	l.f.	.38
Sprigging	11.0	Acre	200.00
Sowing seed	55.3	Acre	100.00
Administration Bldg.			11,995.00
Sewage disposal system			1,236.50
Water well			525.00
Chlorinator			410.00

CHOOSING A POWER SHOVEL

FOR CITY AND COUNTY WORK

FRED L. WHITE
Development and Consulting Engineer, The Osgood Co., Marion, O.

NOT only is the power shovel the work horse of the construction field, but it is probably the most versatile machine available to the city and county for highway and street work, materials handling, sewer and water main trenching, pipe laying, and backfilling. Indeed, these are but a few of the many jobs that a power shovel will do, either in its original incarnation or when converted to a dragline, clamshell, trenchhoe, pile driver or crane. Furthermore, it may be mounted on crawlers, on a special rubber-tired mount, or on a commercial motor truck.

When Used as a Shovel—

As a standard shovel, mounted on crawlers, a shovel will handle any excavation problem except one involving hard rock, which must be broken up by blasting. It can remove any depth of overburden; it can do rough grading; it can load the excavated material into trucks standing on the same level or even some distance above the grade; or it can overcast material. The power shovel is a precision excavator, and the grade can be held very closely or the load spotted precisely for dumping. Though volume is not so important as all-around usefulness and mobility in the city and county field, a power shovel can dig and load materials, such as earth, blasted rock, sand or gravel faster than any other type of equipment.

When mounted on a motor truck or on its own rubber-tired mount, the shovel is highly mobile. However, with rubber tires it is not so well adapted for working in soft ground, and grades cannot be held quite as accurately as when crawler mounted. The shovel on a truck mounting is best adapted to clean-up work in ditches, cutting back banks and removing slides. Its mobility allows rapid movement from one job to another, and it can go to work immediately on arrival. It is useful in gravel banks and borrow pits for loading or overcasting.

When Converted to Other Tools—

Most all revolving shovels are quickly convertible to other types of machines by merely changing the boom and, in some cases, the drum laggings.

When converted to a dragline, such a machine, preferably on crawlers, will remove overburden from quarries, sand and gravel pits; dig ditches, either along highways or cross-country; do clean-out work on ditches and channels; and clean up berms. The dragline is not suitable for grading, and is not so well adapted to loading trucks as a shovel, but due to its longer boom, it can dig and dump further from the machine and can be used to load trucks, but with more spillage than when a shovel is used. It can dig well below grade in earth, gravel or sand, but will not handle rock unless very well broken up.

When used with a clamshell bucket, the dragline is well adapted to excavating footings, for bridge piers or abutments, or for any underwater excavation; and it is also useful in unloading railroad cars of sand, gravel or crushed stone. It excels in handling materials to stock piles or into high bins or hoppers. It can be fitted with grapples or tongs to handle irregular shaped rocks for rip rap or bank protection, or for handling logs or timbers.

Trenching and Driving Piling

When equipped as a trench hoe, this machine economically digs trenches for sewers, water pipes, culverts, etc. It will dig any material except solid rock, which must be blasted, and it will load the excavated material on trucks if desired. It can also be used to handle

● ***WITH dragline attachment, the power shovel handles drainage projects. This is an Osgood Model 200.***

water or sewer pipe into the trench; and by removing the bucket and substituting a plate or board it can be used to backfill the trench. It is an excellent tool for excavating pits or basements as it always works on top of the ground; it can cut vertical walls and does not require a ramp to get out of the hole.

When equipped with pile driver leads and drop hammer, our machine can drive piling for bridges, cofferdams, etc.; as a crane, it can be equipped with a hook block for ordinary crane work, or tongs to handle timbers, and can be used for steel erection for bridges, buildings, etc., and for handling concrete buckets.

What Size to Get

The most commonly used sizes of machines for larger highway construction projects are the 1½-cu. yd. and 2-cu. yd. sizes. For heavy street construction, the 1¼-cu. yd. to 1½-cu. yd. sizes are most commonly used. Machines of 1¼-yd. capacity weigh from 35 to 40 tons; 1½-yd. machines from 45 to 50 tons; and 2-yd. machines from 55 to 65 tons, as shovels. As draglines or clamshells they weigh about 10% less than as shovels. These machines are crawler mounted and are generally moved from one job to another by a trailer. These sizes are too heavy for mounting on rubber tires or on trucks.

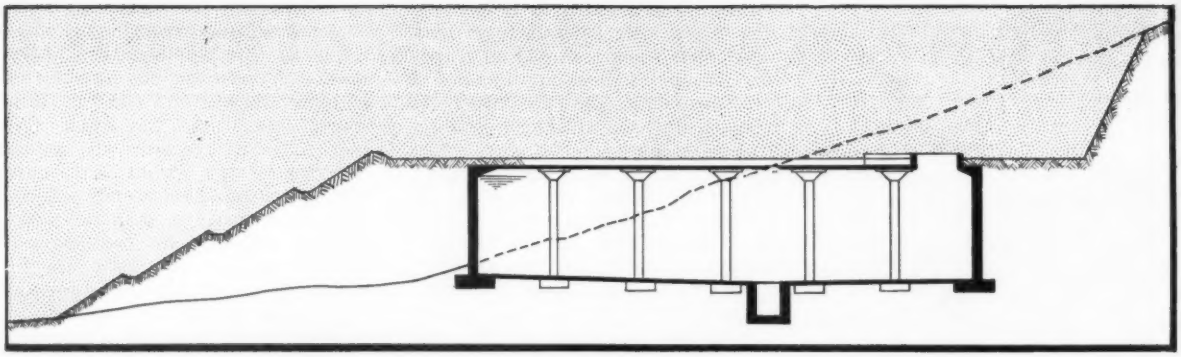
For street construction where clearances are limited, and for street and road maintenance, the most commonly used shovels are the ½-yd. and ¾-yd. sizes. The ½-yd. machines weigh from 12 to 16 tons and the ¾-yd. sizes from 18 to 24 tons, as shovels when mounted on crawlers. These machines are capable of fast operation and are ideal for rough grading, cleanup work in ditches, loading sand or gravel, digging trenches and similar work. They are commonly mounted on crawlers and are moved on trailers from job to job, but, due to their light weight, they are often mounted on self propelled rubber-tire trucks or on motor trucks. When so mounted they are used not only for the ordinary shovel work but also for emergency work in removing slides, opening channels, etc. Their mobility makes them an ideal tool for ditch cleanout since such jobs are generally widely scattered. A few minutes at one spot is all that is required, and they can be moved quickly to the next job.

The ½ and ¾-yd. machines are not generally considered large enough for highway construction, not so much because of the smaller capacity of the dipper, but because of the class of work. For highway construction, in earth moving, the shovel has been supplanted to some extent by the carryall, or scoop, especially where the excavated materials are used for fills and the hauls are short. There is still some question as to the economy of the use of scoops as compared to shovels and trucks, but at this time the trend is toward the use of scoops for this class of work. The only machine available at the present time, however, for excavating rock, shale or cemented gravel is the power shovel, and because of the heavy nature of this work, the larger sizes of power shovels will stand up to it much better than the small machines. The cost of labor also enters into this to some extent as no more labor is required to operate a 2-yd. shovel for instance, than for a ¾-yd. The shovel is also the best tool for making side hill cuts where the material is overcast and does not have to be hauled.

Some ⅜-yd. machines, generally mounted on motor trucks, are used for highway maintenance in the same class of work as that for which ½-yd. and ¾-yd. machines are used. They are excellent for loading gravel from pits and if sufficient trucks are supplied, they will load up to 750 tons per day. They will not, of course, do as much or as heavy work as the larger machines, but they are more economical to operate and the investment is less. These machines weigh from 8 to 10 tons as shovels, when mounted on crawlers.

● ***THE TOWN MANAGER of Fort Fairfield, Maine, devised this combined loading and screening rig. The Link-Belt ½-yd. shovel handles the screen as well as loading the sand.***

The power shovel, with its various attachments, is probably the most versatile tool in the street and highway engineer's list, in that it is adaptable to more different kinds of work than any other one piece of equipment. It is the work horse of material handling equipment and handles the heavy work which no other machine can do so rapidly or so economically under so many varieties of conditions.



● ***GROUND PROFILE** and section through the Glendale reservoir, showing necessary excavation and method of terracing slopes.*

EFFICIENT CONCRETE PLANT DESIGN HELPS BUILD CALIFORNIA RESERVOIR

MAXIMUM advantages of gravity and terrain have been utilized in designing an on-the-job concreting plant for the 3.8-mg. water reservoir now under construction for Glendale, California. Mac-Isaac and Menke Co. of Los Angeles, general contractors for the work, designed the efficient mixing arrangement which will handle up to 250 cubic yards of concrete per day as a 4-man operation.

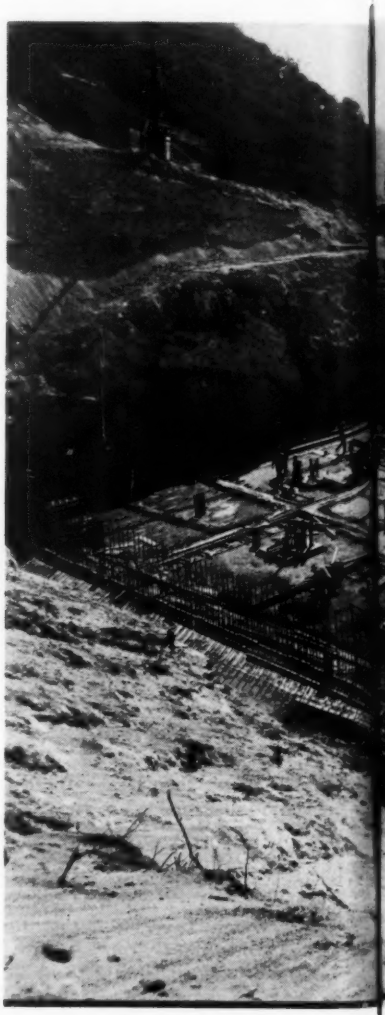
Situated on the face of a 35-foot high, 50° slope convenient to the top level of the reservoir, the plant is fed from the top by a 600-ft. truck road built for the job. Aggregate is discharged into four wooden bunkers anchored into the steep slope by 1-inch rods sunk 6 feet into the granite. The #3 rock and sand bunkers, the largest, occupy the center of the line and carry the heaviest loads; the smaller pea gravel and #2 rock bunkers are on the sides.

Gravity delivers the aggregate directly from the bunkers to four Garlinghouse bins, equipped with a batch scale. These discharge into two ½-yard mixers—one Jaeger and one Koehring. The arrangement is such that both can be handled by one operator. Two ½-yard mixers are used in preference to one larger mixer so that, in the event of mechanical break-down, the pour may be finished with the remaining operating mixer.

Cement in bags is delivered at the top of the hill to a shed for storage. From there it is fed by gravity to the mixers by a metal lined chute on a 26½° slope. This is in front of and on the same working level with a grizzly placed over the receiving hopper of each mixer. A knife blade protrudes upward from the center of each grizzly so that when the feeder pushes the sack over the grizzly the blade slits the sack and the cement is released.

A lean cement slab roadway carries the buggies from the discharge end of the plant to the reservoir site.

About 3500 yards of concrete will be required for the reservoir which will be 120 ft. wide, 180 ft. long, and 27 ft. deep. As the purpose of the reservoir is not to impound water, but is merely one of short-



● ***RESERVOIR** under construction. Forms are in place for a part of the roof; some footings have been poured. Efficient mixing plant shown at right will handle up to 250 cu. yds. per day with four-man operation.*

time storage, the site is on a knoll with no drainage area to the rear. The reservoir is entirely in excavation, requiring about 35,000 cubic yards.

Reservoir Details

The tank is divided in half by a 1 ft. 6-inch baffle wall to provide for minimum storage facilities in the event that one of the two compartments becomes unserviceable. The division wall is set on a 6-ft. footing. The floor is an 8-inch slab reinforced both ways, and both halves slope inward 1 ft. to sumps located near the two centers; 30-inch concrete supply lines, cradled in concrete, lead out from these sumps which are 6 ft. wide and 6 ft. 9 ins. deep.

There are 35 concrete mushroom-type columns set on 20-ft. centers. All construction joints carry a copper water stop and this is continuous around each column footing where the floor slab rests on the footings. Typical column footing is a 7 ft. square of concrete reinforced with ½-inch hairpin bars with hooked ends.

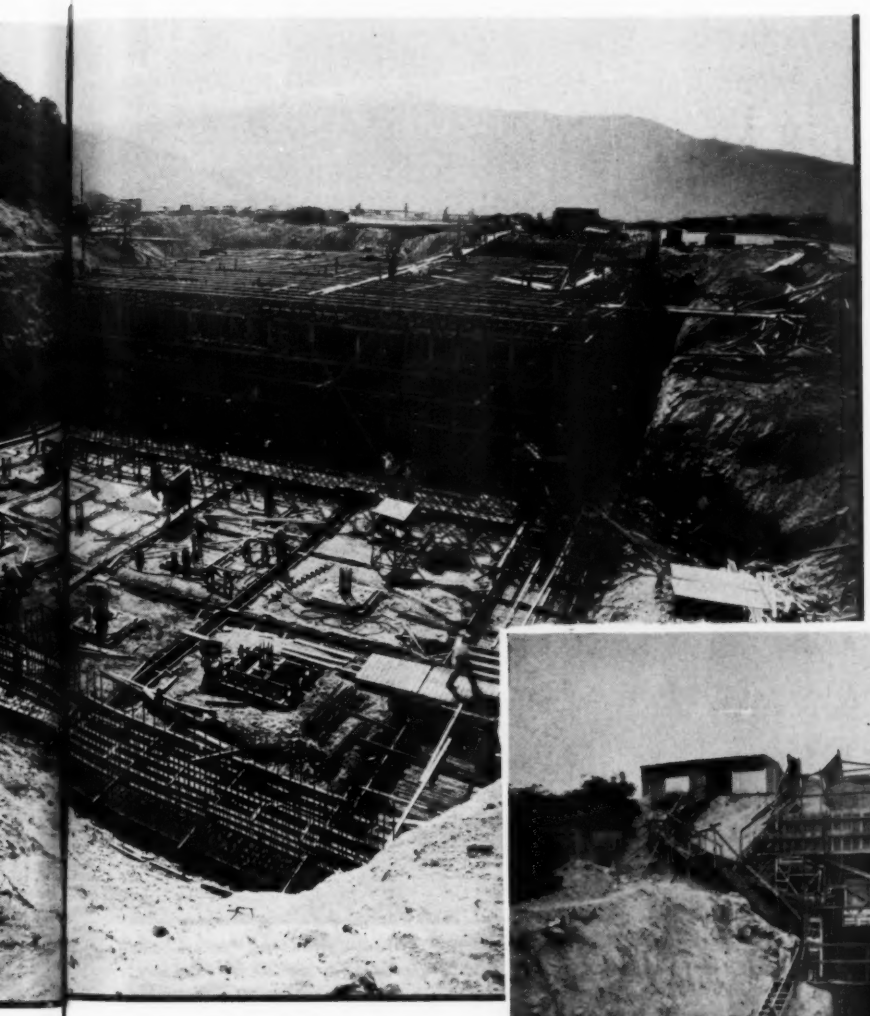
The roof will be a 9-inch four-way reinforced flat slab pitched slightly away from center to provide drainage. It is tied into the 2-ft. thick walls. Bolts, anchors and staples are of silicon bronze to prevent corrosion. After the project is complete the roof will be covered with a 2-ft. layer of soil to insulate the concrete against temperature variations.

Three access hatches in the roof are provided with #10 gauge sliding steel doors. Two hatches are 8 ft. by 10 ft. and one is 4 ft. by 6 ft. A ladder from the smaller hatch leads downward to the top of the baffle wall which is flanked on both sides by additional ladders giving access to the floor on either side.

An extensive sub-drainage system, requiring more than a mile of 4-inch and 6-inch vitrified clay pipe, is located under all construction joints and foundations. This will serve two purposes. If at any time a substantial upward water pressure tends to develop under the slab floor, this pressure will be released by the drainage system. Also a possible leak may be located and isolated quickly. Inspection pipes from the system are projected above the ground level at a point 150 feet below the tank and these will be inspected daily. The four areas of the drainage system serve different portions of the reservoir and a heavy flow from any one quadrant would facilitate the early detection and isolation of a leak.

Leak detectors are also provided in the form of subdrains on either side of the supply lines into the reservoir. These lines are cradled in concrete and tied into adjacent banks at intervals with small headwalls or collars.

A vitrified clay pipe system around the outside of the tank will further collect any surface seepage that might develop. This system is of 4" and 6" pipe with caulked joints, and is laid in the same manner as the tank itself.



DIESEL-PUMP TEAM CUTS DRAINAGE COSTS

WILLIAM H. GOTTLIEB

FOR 46 years the South River Drainage District, a few miles north of Hannibal, Missouri, has been working to protect its 10,000 acres of arable land against damage by uncontrolled waters. First task was to keep the Mississippi from flooding the land, so ten miles of levees were constructed. Next problem was the rainwater that was denied normal exit to the river because of the levees. Since 1909 the district has pumped away this excess, first with steam engines driving 36-in. pumps, and then with Fairbanks-Morse diesel engines driving F-M horizontal propeller pumps. In operation since 1936, the diesel-pump team has handled the drainage at an average cost of 20 cents an acre-foot.

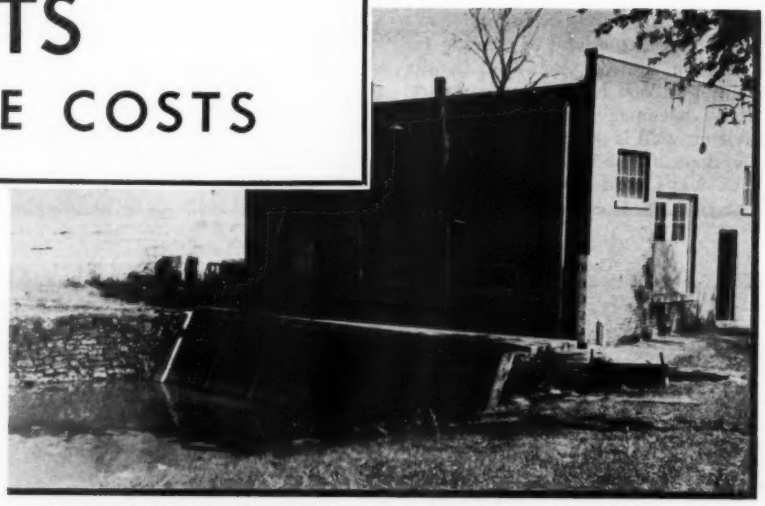
A detailed summary of costs and pumping activity with the new equipment has been compiled by the U. S. Army Engineers for every year since 1939 when a new Mississippi dam raised prevailing river levels, obligating the Federal government to share pumping costs of the drainage districts. In the nine years from 1939 through 1947 the South River Drainage District spent $13,902.71 on plant labor; $8,658.22 on fuel; $3,274.90 on lubricants; $5,167.70 on maintenance, repair and supplies; and $2,302.82 on miscellaneous items, making a total operating expense of $33,428.27, an average of $3,603.14 a year.

In these nine years South River's diesels and pumps have handled 166,337 acre-feet of water with a weighted average static lift of 6.002 ft. Thus, the district has spent 3.347 cents per acre-ft. per ft. of static lift, which is a saving of more than 60 percent under the cost of operating the steam plant. The savings already have been great enough to pay off the entire cost of the diesels and pumps.

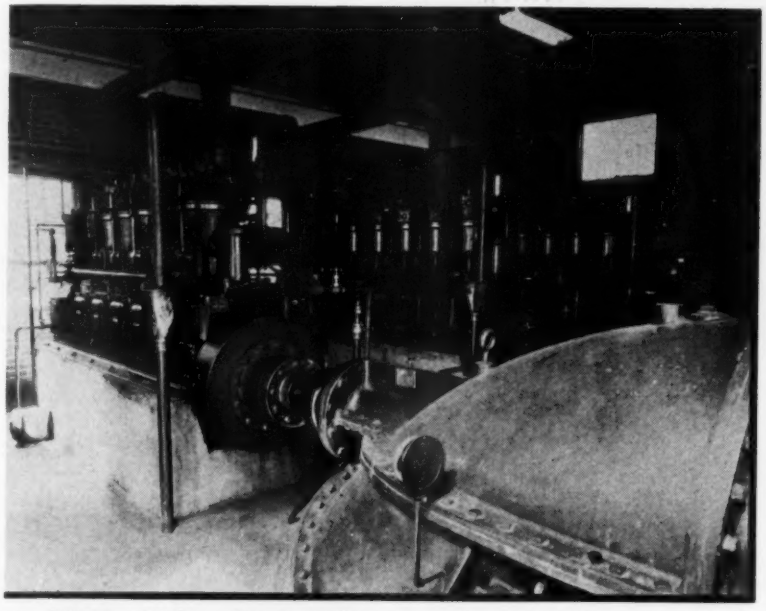
Operating expense was not the sole consideration that induced district landowners to purchase new equipment. It was necessary to have pumps that could handle high stages and also pump efficiently at the low heads encountered through most of the year. The solution to this dual requirement was found in the 42-in. horizontal propeller pumps. This type of pump gives better than 85 percent efficiency at 20 ft. TDH and nearly 80 percent efficiency at 12 ft. TDH.

The most efficient power supply available was also desired. Across the river, purchased electric power cost more than 2 cents a kilowatt-hour which meant more than 5.9 cents per acre-ft. per ft. of static lift for power alone without figuring labor and other expenses.

The engines of the South River plant are five-cylinder, 8¾-in. bore by 10½-in. stroke, Model 35 Fairbanks-Morse diesels, each rated at 150-hp. at 450 rpm. Each of the



● *REAR VIEW of South River Drainage District pumping station, showing intake screens. This plant houses the engines shown below.*



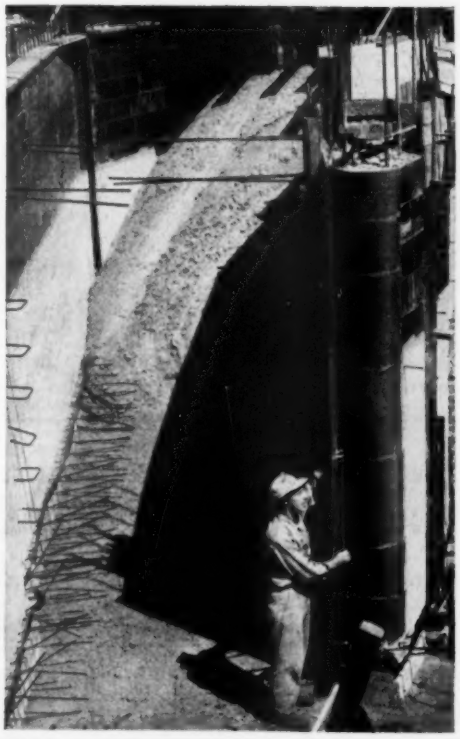
● *THREE 150-hp. diesel engines are direct-connected to 42-inch horizontal propeller pumps of 85% efficiency at 20 ft. TDH.*

Vitrified CLAY PIPE AND CLAY LINER PLATES

PREVENT CORROSION AND DISINTEGRATION IN NEW 46 MILLION DOLLAR DISPOSAL PLANT

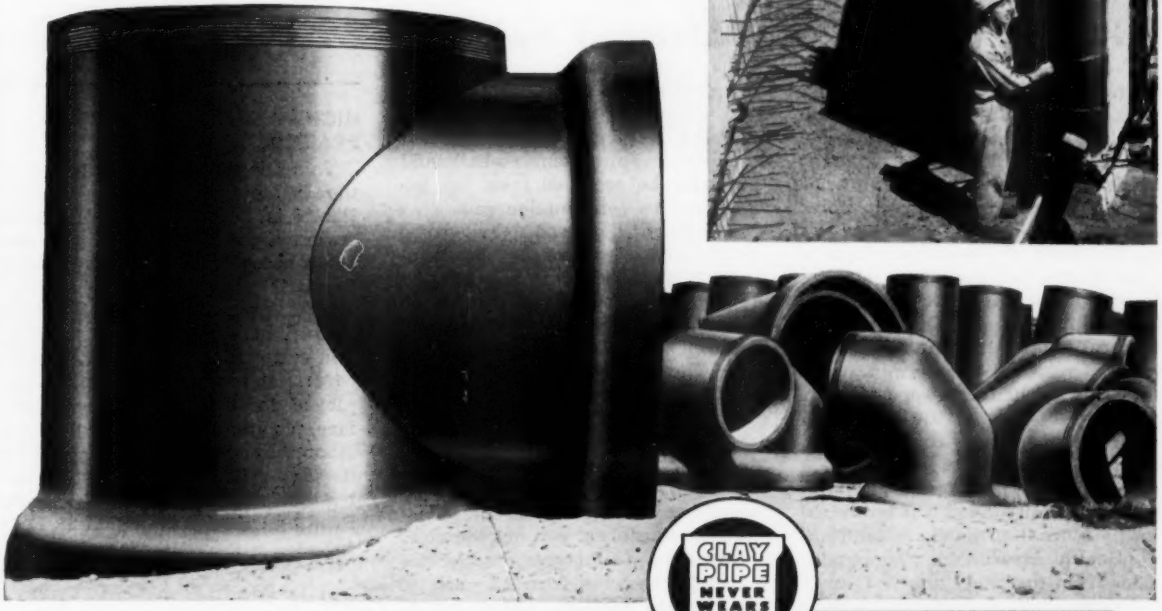
THE new sewerage treatment plant under construction at Hyperion, near Los Angeles, is designed to process waste disposal from an area populated by 3 million people. Its outfall sewer — 55 miles in length — is the longest of its type in the world.

Engineers in charge of the project rely on rust-proof, non-deteriorating Vitrified Clay Pipe and Clay Liner Plates to protect against acid attack. They know that Vitrified Clay Pipe is the *only* pipe that resists corrosion and crumbling . . . the *only* pipe that gives trouble-free service in *any* sewerage or drainage installation.



Corrosion-proof Vitrified Clay Liner Plates in huge sludge tanks protect masonry from acid-attack →

↓ *Vitrified Clay Fittings afford flexibility in laying and provide non-corrosive, non-deteriorating lines throughout the plant*



CLAY PIPE NEVER WEARS OUT!

A.S.T.M. ACID TESTS HOLD NO TERROR FOR VITRIFIED CLAY PIPE

Vitrified Clay Pipe withstands A.S.T.M. tests for acid-resistance without mar or mark. Clay Pipe comes through 48 hours of immersion in fiery acid solutions with flying colors. The reason? *Vitrification* at temperatures exceeding 2,000°F. makes Clay Pipe TOUGH . . . welds the pipe into a solid, integrated conduit that *cannot* rust, corrode or crumble.

NATIONAL CLAY PIPE MANUFACTURERS, INC.

703 Ninth and Hill Bldg., Los Angeles 15, Calif.
1105 Huntington Bank Bldg., Columbus 15, Ohio
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
206 Connally Bldg., Atlanta 3, Ga.

Vitrified CLAY PIPE

C-749-1

three units drives a pump directly through an F-M flexible coupling. Fuel oil is unloaded into two 10,000-gal. horizontal storage tanks by a 40 gpm. Fairbanks-Morse rotary pump and then transferred by the same pump through edge-type filters to the engine tanks. Engines are lubricated with Stanolind Nonpareil Heavy Duty Diesel Oil Light. Lube is drained and replaced with new oil periodically. Engine-driven pumps draw cooling water from the canal, put it through the cylinder jackets and discharge to the canal. Thermostatically-controlled bypass valves keep jacket temperature at the desired level. The diesels are started with compressed air supplied by a motor-driven Fairbanks-Morse compressor. The plant also is provided with a priming pump, a Nash Hytor vacuum pump driven through a flexible coupling by a 10-hp. motor.

South River is fortunate in its pumping arrangement. The plant is located on the Bay de Charles, a six-mile elbow of the Mississippi. The head of the bay is cut off from the river by the levee which again cuts across the bay at the plant site four miles to the south. Thus, the four-mile section of the bay constitutes a reservoir into which district rain water drains. The plant pumps from the reservoir across the levee into the open section of the bay which empties into the river two miles further south. This arrangement is an important safety factor for the district and simplifies operations. The reservoir can be kept low and there is little likelihood that even the heaviest rains will outstrip the pumps and the reserve capacity of the bay.

The district is managed by a Board of Supervisors: S. F. Schultz, President; James Matless; Claire Mings; Oney D. Bowen; and Delbert Hartley. Enid A. Foster is Secretary-Treasurer, and John L. Plowman, Attorney. The plant is operated by G. F. Sultzman.

Bacterial Contamination of Tomatoes Grown in Polluted Soil

One of the sanitary engineering and public health problems of the war was the use, in so many parts of the world, of human excrement for fertilizer. It was not known what effect the consumption of vegetables and fruits so fertilized might have on the health of our soldiers. In general, it was felt necessary severely to restrict the use of such foods. Following the war, the Quartermaster General of the Army initiated a program of research to determine what the facts might be. A report of experimental work on the growth of tomatoes under such conditions was recently submitted by Lloyd L. Falk of the New Jersey Agricultural Experiment Station, and was published in the Journal of the American Public Health Association. The conclusions from the study are:

1. The residual coliform contamination on the surface of tomatoes with normal uncracked stem ends grown on polluted soil was no greater than that on tomatoes from unpolluted soils. Whether the pollution was added to the soil prior to or concurrent with the growth of the plants made little difference.

2. When the stem ends of the tomatoes were abnormally split, the coliform contamination was higher regardless of the soil. This pollution was three times higher when the soil received sewage irrigation during growth than where the pollution had occurred prior to planting or not at all. It should be pointed out that these split stem ends would normally be removed from the tomato before consumption raw.

3. Sunlight appeared to have some deleterious effect on the contaminants of exposed tomatoes, but the protection of cracks and crevices on tomatoes with abnormal stem ends reduced this effect considerably.

4. The absence of any clear-cut tendency for lower contamination of the higher growing fruit as well as the inability of waterproof paper spread on the ground to decrease contamination indicated that direct splashing of the soil on the plant during rainstorms was not the chief controlling factor responsible for carrying bacteria from the soil to the tomato surfaces. Other factors such as wind-driven dust, dirt raised during cultivation, and movements of insects may be of equal if not greater importance in this respect.

5. When tomatoes were sprayed, during growth with suspensions of feces or *Escherichia coli* it was found that within a month the surface coliform contamination had been reduced to or below that of the unsprayed controls.

6. When *Salmonella* cerro suspensions were sprayed on tomatoes in the field, the organism could not be recovered after 7 days. This indicated a comparatively rapid death rate under these conditions compared with the fecal coliform organisms.

Summary

The results obtained on the concentration of coliform bacteria on the surfaces of tomatoes grown in polluted soil indicated no abnormal gross contamination. Even when crops were sprayed with fecal suspensions, surface coliform counts were no greater after one month than on control tomatoes. The failure to find *Salmonella cerro* 7 days after its application to growing tomatoes upholds the contention that organisms of fecal origin will not be present in sufficient numbers to cause gross contamination.

On the basis of these results it is felt that the growth of tomatoes on soil that had received nightsoil or sewage sludge fertilization would yield crops which, if eaten raw, would not be likely vectors for the transmission of human bacterial enteric diseases.

Book Reviews

HIGHWAY PRACTICE

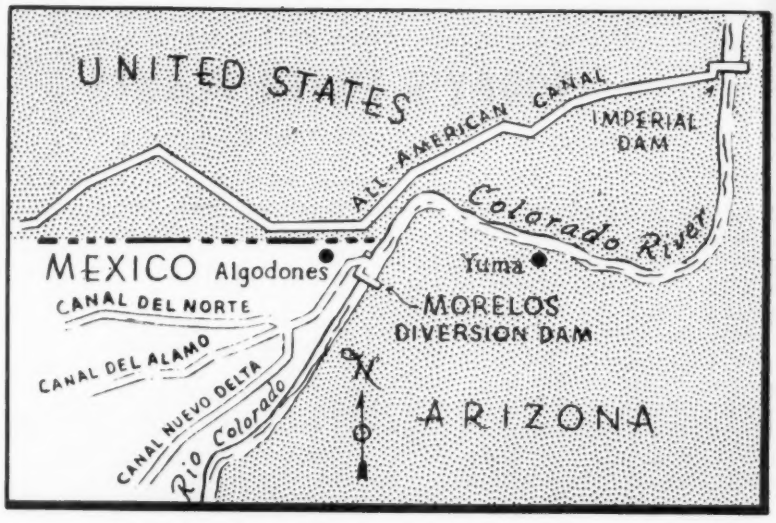
This 230-page book is a product of the Public Roads Administration. Part I is largely historical; Part II covers highway planning and presents accepted standards of design for both roads and bridges; Part III discusses location, soil surveys, embankment and subgrade stabilization and road surface types; Part IV covers the construction methods employed for each type of road surface, plus job management, field and laboratory control, equipment and its use, and maintenance. Superintendent of Documents, Government Printing Office, Washington 25, D. C. 45¢.

•

VALVE MANUAL

This is a manual designed to serve as a guide in the selection and maintenance of valves used in water works. It gives good practice in valve selection, use and maintenance. The manual contains some 70 pages; 4 pages are devoted to selection; 7 pages to maintenance; 4 pages to operation; and 45 pages to descriptions of types of valves. It is published by Missouri Water & Sewerage Conference, Sixth Floor, State Office Bldg., Jefferson City, Mo., and sells for $2.

DEWATERING DAM REQUIRES 3,800 WELL POINTS



A RECORD number of well points was necessary for dewatering the cofferdam in constructing the Morelos Dam on the Colorado River, just across the U. S.-Mexican border. This dam, which is being built by Morrison-Knudson de Sonora, S.A., is a concrete dam 45 ft. high and 1,432 ft. long. It is not a storage dam —this function will be performed by the Parker Dam and by the Davis Dam, now under construction—but a diversion dam, designed to insure an adequate flow into the Alamo Canal which serves northern Mexico. Under the international treaty, Mexico is guaranteed 1.5 million acre-feet of water annually, if available. The new dam will not raise the water level of the Colorado.

The Morelos Dam will rest on a rolled fill foundation enclosed by parallel rows of steel sheet piling spaced 33 meters, or about 100 ft. apart. At present construction is being carried on in a cofferdam on the right (west) side of the river. An earth embankment encloses an area of about 15 acres in which operations are underway. Excavation was necessary to a depth of about 40 ft. below the river bottom; and the excavated area is being built up with compacted fill, forming the body of the dam.

Installing Well Points

Since it was expected that water would be a problem, excavation was so planned as to permit effective use of well points for dewatering. The drainage system was designed for installation in three main stages with a fourth supplementary stage for the deepest portion of the cut. The first stage of dewatering consisted of 900 points and 14 pumps. These were sunk from El. 31.5 meters, and were intended to intercept seepage through the main cofferdam. This group of points completely encircled the area being excavated.

As the excavation was carried down, a second installation was made at El. 27.5 meters. This consisted of 1000 well points and 19 pumps, and the points also completely encircled the excavation. A third set of points, consisting of 500 points and 9 pumps, was sunk from El. 24.5. This installation did not completely encircle the excavation. The fourth stage, sunk from El. 21.5 meters, consisted of 350 points and 7 pumps.

At the bottom, the excavation was 120 ft. wide, and the well points around the working area were not able to remove all the water from the central portion. Consequently, a drain was constructed on the center line of the excavation to collect and remove seepage. This consisted of slotted 16-inch pipe backfilled with gravel and serviced by two pumps. After excavation was completed, and fill was placed, the drain was grouted, using a cement, bentonite and sand mixture to insure tightness.

The well points were driven in the following manner: A casing was forced down by jetting; the well point was inserted in the casing; the casing was filled with sand; and the casing was then withdrawn. The sand forms a porous core which increases the ability of the well point to collect water. In some cases, the casings had to be driven into the earth with power tools.

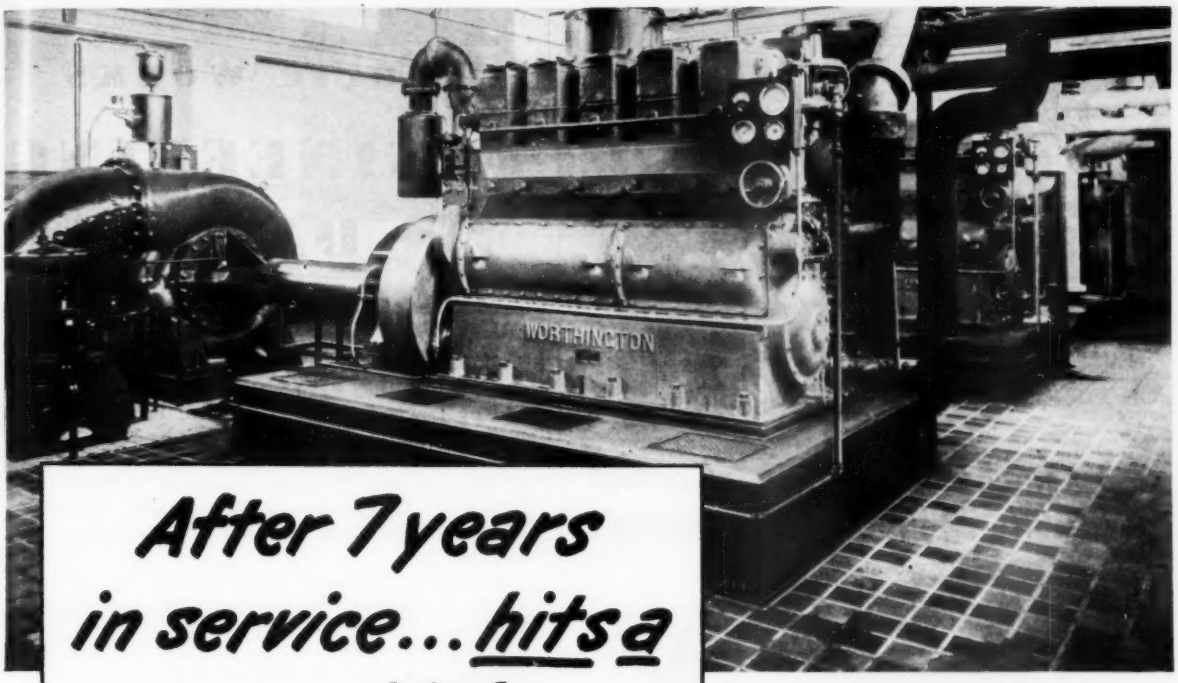
To serve the 2,750 well points in the cofferdam area (another 1,000 points were used in the tail race and other areas), 49 pumps were installed. The maximum pumping rate at any one time was about 17,400 gpm. This was discharged into the river. For the entire installation, about 10,000 feet of piping were required. The well points were furnished by the John W. Stang Corporation and the pumps by Gorman-Rupp Company. The dewatering system has been highly effective and has maintained satisfactory working conditions despite the type of soil and the depth of excavation.

The compacted fill is being carried up between the two rows of sheet piling. At the level of the top of the piling, the fill is covered with a concrete pavement which performs the dual function of supporting the 20 radial gates in the main dam structure, and of preventing access of water into the fill. To care for such water as may penetrate into the dam, a special percolation filter is provided which collects the water and discharges it from the dam through weep holes in the piling.

To prevent scour of the river bottom, a layer of riprap 8 to 10 ft. thick will be placed for about 90 feet upstream from the dam and 150 ft. downstream.

At the western end of the dam 12 gates will be installed to provide for the diversion into the Alamo Canal.

The dam, when constructed, will be operated by the International Boundary Commission. The dam was designed and is being built under the direction of the Ministry of Hydraulic Resources of Mexico. E. E. Mendez is district manager; J. R. Magena is resident engineer; J. D. McClary, vice president of Morrison-Knudson de Sonora, S. A., is project manager; A. G. Cadaval is chief engineer; C. S. Bradley is assistant project manager; and Carl Larson is general superintendent.



After 7 years in service... hits a new high!

In the municipal plant at Gary, Indiana, three Worthington Gas Engines drive Worthington Centrifugal Pumps, lifting raw sewage to the sewage-treatment plant.

Worthington Gas Engines And Pumps Aid Gary's Sewage-Treatment Plant To Roll Up New Records

During its seventh year of operation, the big sewage-treatment plant of the Gary, Indiana, Sanitary District topped all its previous records for solids removal with a daily average of 0.199 lbs per capita. In addition, the usual high percentage of oxygen demand reduction was maintained, while both gas production and value of the gas used were the highest in the plant's history

Three Worthington Gas Engines, driving Worthington Centrifugal Pumps, are the primary power units. Throughout the world Worthington Engines in this type of duty are matching the Gary performance with similar year-in-and-year-out dependability — serving their communities with continual savings in power and maintenance costs.

YOUR OWN PLANT WILL BENEFIT . . . by this economical, trouble-free engine performance that proves *there's more worth in Worthington*. For further details on the broad range of Worthington Engines for sewage plant service — including the famous Dual Fuel Diesels that use gas, oil or gas-and-oil in any ratio — write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y*

WORTHINGTON

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YOUR PARTNER IN POWER PROGRESS

Diesel engines, 150 to 2,640 hp . . . gas engines, 175 to 1,720 hp . . . dual fuel engines, 225 to 2,640 hp.

WORTHINGTON-BUILT AUXILIARIES


Balanced Angle Compressors


Oil Transfer Pumps


Cooling Water Circulating Pumps


Evaporative Type Engine Water Cooler

PUBLIC WORKS ENGINEERING DATA

Cost of Water Main Construction

A total of 7,861 ft. of water main extensions were laid by Lewiston, Ida., in the year ending June 30, 1949, according to the annual report by W. P. Hughes, City Engineer. The average cost of the pipe was $2.1539 per foot. The pipe consisted of 3,155 ft. of 2-inch, 924 ft. of 4-inch, 3,528 ft. of 6-in. and 253 ft. of 8-inch. Unit costs on 4, 6 and 8-inch pipes were as follows:

For 8-inch: Excavation, $143.36; laying pipe, $72.80; backfilling, $63.84; materials, $732.88; total, $1,012.88; cost per foot, $4.

For 6 inch: Excavation, $1,123.20; laying pipe, $757.48; backfilling, $362.22; hauling pipe and taking out old pipe, $123.26; materials, $7,081.91; total, $9,448.47; cost per foot, $2.68. On four jobs, costs ranged from $2.41 to $3.22 per ft.

For 4-inch: For excavation, $249.68; laying, $224.48; backfilling, $92.72; hauling, $27.20; materials, $880.73; total cost $1,473.81; average cost per foot, $1.59. On three jobs, average cost ranged from $1.47 to $1.91 per foot.

Refuse Collection and Disposal in New Jersey

There are 566 municipalities in New Jersey. A recent survey by the State Department of Health indicated some trends in practice. In 196 communities, the refuse collected was disposed of within the limits of some other municipality. In 275 municipalities, all refuse was collected at public expense, either with municipal equipment or by contract. In 177 municipalities there was no collection service at public expense, but it is not stated how collections were paid for. Private collectors were licensed in 123 communities.

Nails Picked Up From Highways for 9c per Pound

A nail or other sharp bit of metal on the highway weighs only a few ounces yet may cost a passing motorist many dollars in tire replacement. Picking up a pound of nails and other metal objects from the highways of Texas last year cost only 9c per pound when done with the Texas Highway Department's magnetic nail picker. Sixty-nine thousand pounds of metal were removed from the highway by one magnetic picker last year. This machine covered sixteen thousand miles of roads in 187 days to pick up more metal than at any time since the war. During the war the same magnetic picker sometimes pushed over the 100,000 pound mark by running the roads of military establishments in addition to cleaning regular highways.

PUBLIC WORKS DIGESTS

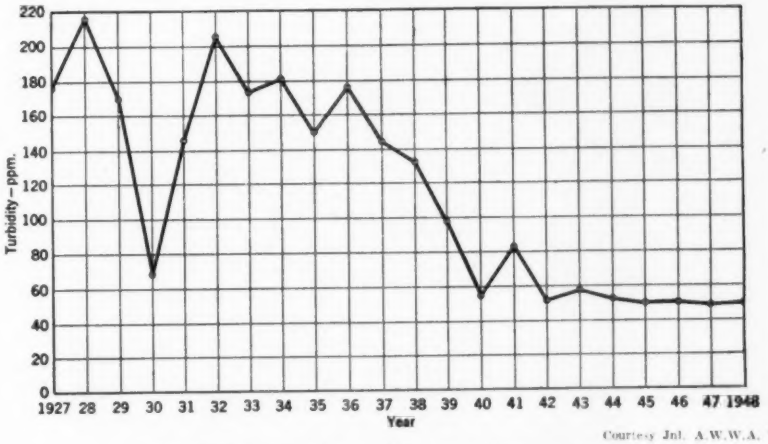
This section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

THE WATER WORKS DIGEST

Effects of Impounding On Water Quality

The T.V.A. operates 33 dams in controlling the streams in the Tennessee River drainage basin. Impoundage in the reservoirs so formed has affected many of the qualities of the streams as regards their use for public water supplies, the beneficial effects far outweighing the undesirable ones. Briefly, the effects have been as follows: Fluctuations in discharge have been reduced markedly, as have those in water levels at waterworks intakes. Coliform bacteria decreased 80% at Knoxville and 97.5% at Chattanooga. Temperatures are much more constant. Average annual turbidity was reduced 78% at Chattanooga and 61% at Knoxville, permitting reduction in amount of alum. Color decreased. There was little change in alkalinity, or pH. There was an increase in tastes and odors, presumably from algae. In general, these changes have simplified operation of treatment plants.

F. W. Kittrell and Fred W. Thomas —"Effect of River System Development on Water Quality in the Tennessee Valley"; Am. Water Works *Assn. Journal*, September.



Courtesy Jnl. A.W.W.A.

Average annual turbidity at Chattanooga.

Softening Plant Changes at La Verne

La Verne, Calif., in 1941 began operating a water softening and filtration plant, using the lime-zeolite process, which was chosen instead of the lime-soda ash chiefly because salt for regenerating the zeolite was abundant and cheap there and soda ash was expensive. After seven years' operation the capacity was outgrown, and was doubled by a plant that has just been completed. Experience with the old plant suggested some changes in the plans for the new one. Instead of the center-feed-well settling basin with peripheral overflow, the new unit is a double-deck cross-flow type. The water enters the lower deck at one end and at the other end rises to the upper deck and flows through the length of that to overflow weirs. Straight-line sludge scrapers travel in the direction of flow of the water,at approximately the same speed, and the same mechanism scrapes both decks.

The new rapid sand filters are duplicates of the old, operating at 3 gpm per sq. ft. The 12 new zeolite softeners provide for a 4 ft. depth of zeolite instead of the 3.5 ft. of the old plant. It has been planned to use porous plates or underdrains, instead of the header and laterals with brass strainers used in the old. However, a 6-month test of porous plates in one of the original softeners showed that they became fouled with an after-precipitate of aluminum hydroxide, and the plan for the new units was changed to a false-bottom type consisting of precast concrete blocks 2' x 2' x 3½" with 1" brass pipe with brass umbrella strainers cast into the concrete, covered with 20" of graded gravel under the zeolite.

R. B. Diemer — "Metropolitan Water District Doubles Capacity of La Verne Softening and Filtration Plant"; *Civil Engineering*, October.

Automatic Control For Water Works

Automatic control, when appropriate and properly applied, offers as advantages improvement of qual-

ity of product and service, improvement in quality of personnel (by eliminating menial and distasteful tasks), improvement in reliability, and reduced costs. It should not be employed where technology does not permit satisfactory control, where reliable design is not possible, where adequate maintenance can not be obtained, and where no advantage can be shown.

Automatic control involves a measuring device, a regulating device, and a connecting link. The last may be mechanical, hydraulic, pneumatic or electric. There are numerous types of electric links; the type to be used will depend on the distance and economic considerations in providing the communicating channel. Several types of electric links include direct electrical interconnection, self synchronizing generators and motors ("Selsyn", "Synchrotie" and "Elinco"), time impulse ("Chronoflo" and "Metameter"), telephone signal, and supervisory control. Less commonly used are the torque balance system, the inductance bridge principle, the variable frequency method, and the high-rate impulse method.

Vance C. Lischer — "Advantages and Limitations of Automatic Equipment"; *Am. Water Works Ass'n Journal*, September.

When you need special information—consult READERS' SERVICE DEPT. *on pages 65-69.*

Prestressed Concrete Tanks

When prestressing of circular tanks was first attempted, about 25 years ago, no allowance was made for shrinkage and plastic flow. Research begun in 1933 disclosed that it is essential to include in the reinforcing steel a minimum excess of 35,000 psi to absorb subsequent stress losses due to shrinkage and plastic flow, in addition to the stress required to meet design loads. If rods are used that can safely be stressed to 50,000 psi, only 15,000 psi remains for working purposes. Wire is used by Preload Corp. that can safely be stressed to 140,000 psi. leaving 105,000 psi for working stress and reducing to weight of steel needed to 1/7.

For the walls of a tank it is usually more economical to use pneumatic mortar where the walls are less than 6" thick and concrete where they are thicker. After the wall has been cured for at least 7 days, the steel wire is wound on by means of a self-propelled machine in one continuous operation, stressing it within accurate limits, at rates up to 7 miles per hour. The wire is immediately covered with pneumatic mortar about 5/8" thick. For vertical reinforcement, groups of 4 or more wires are placed in vertical keys extending the full height of the wall and are brought to the desired stress, and the keys are then filled with pneumatic mortar. The roofs are made in the form of a dome, the average thickness ranging from 2" to 6", depending on the diameter. After it has been placed and cured, wire is wound around the dome ring under a stress that causes the dome shell to rise from its form.

Curzon Dobell — "Design, Construction and Uses of Prestressed Concrete Tanks"; PUBLIC WORKS, October.

Regulation of Water Use in Air Conditioning

Different communities present radically different air conditioning problems, depending upon the water temperature. If this is below 60°F it may be used directly in the water coils of the air conditioning apparatus as a substitute for refrigeration, thereby cutting the cost of air conditioning perhaps as much as

50%. If the water temperature runs well above 60°, refrigeration is necessary. In the first case the amount of water used can be decreased by increasing cost for refrigeration, and regulation of amount of water used to a reasonable minimum is practicable.

Where the water temperature is above 60°, conservation of water can be accomplished by evaporative condensers, cooling towers or other equipment, reducing the requirement for water to only the amount needed for makeup and flushout purposes. This may reduce the amount of water used by as much as 95% and save in cost of water sufficient to offset the cost of the conservation equipment. The amount of water used in air conditioning at peak-day loadings may range from 22% to 50% of the day's output; but such use probably will not be maintained for more than 1,000 hr. per year in the north and 1600 in the south, and possibly for only 100 hr. But the supply, treatment plant, storage, pumping and distribution system must be adequate to meet the maximum demand. If the users of water for air conditioning be required, by means of a surcharge, to provide a fair return on the additional cost necessary to meet their requirements, such surcharge would be so prohibitive that water economizers would be necessary. The real solution seems to be the establishment of regulations requiring water conservation equipment to be an integral part of all installations.

The committee of the A.W.W.A. which prepared the report from which the above is abstracted, presented with it tentative regulations, which would provide that all compressor type refrigeration units having a standard rated capacity of 5 tons or less may be equipped with water-cooled condensers using water from the mains, provided that at no time shall the requirement for water exceed 10 gpm if its temperature is 75°F or lower, or 15 gpm if above 75°. All such units of more than 5 tons rated capacity must be equipped with evaporative condensers, evaporative coolers and condensers, cooling towers or other water-cooling equipment, so that water from mains is used for makeup purposes only, and shall not exceed 0.1 gpm per ton. If other than compressor types of refrigerators are used, the consumption of water per ton of refrigeration shall not exceed that specified above.

"Regulation of Water Use in Air Conditioning"; *Am. Water Works Ass'n Journal*, August.

Recharge of Ground Water on Long Island

Nassau County, on Long Island east of New York City, depends on ground water for its water supply. The only source of the ground water is the precipitation, which averages 42" a year, less than 50% of which seeps into the ground. There is a population of 600,000 in the several communities in the county, and their street paving and buildings greatly reduce the infiltration. To increase the supply available, the county has, since 1935, constructed 14 recharge basins with a total area of 40 acres, and others have been built by real estate developers. These receive storm water which otherwise would flow into the ocean through storm sewers or water courses. They conserve approximately 16 mgd, and others are contemplated which will increase the amount to 40 mgd.

In connection with this program, the Dept. of Public Works of Nassau County and the U. S. Geological Survey in May, 1949, began making a cooperative study of evaporation and infiltration at an artificial impounding and recharge basin in the

County. The purpose is to obtain more accurate data on the rate of infiltration in an artificial basin, evaporation from land pans and floating pans, precipitation, temperatures of air, water and soil, and the fluctuations of ground water. The test basin is 40 x 50 ft.

In operating its recharge basins, the County cleans them twice a year to remove silt. A tooth harrow is used for scarifying to shallow depths and kerosene flame throwers remove deeply rooted weeds scattered over the bottom and side slopes. The use of sodium arsenate as a weed killer has been discontinued because of its toxicity. The areas around the basins are graded, landscaped, planted and developed into parks for recreation.

W. Fred Welsch—"Conservation of Ground Water Resources, Nassau County, N. Y."; *Water Works Engineering*, August.

Preventing Taste and Odor in Impounded Water

Control of algae by use of copper sulphate to prevent tastes and odors is a long-established practice. L. Silvey, of North Texas State Teachers College believes, after years of its use, that it is an expensive and temporary expedient; also, that odors normally attributed to decomposition of algae are actually due to other organisms which are closely associated to algae, multiply quite rapidly when the algae are killed and produce the tastes and odors. If the flora and fauna in a body of water are kept in balance—a problem for biologists—algae should give no trouble. This control includes stocking with fish to feed upon the algae and water plants; he suggests catfish, white crappie and hickory shad for muddy water; and black bass, black crappie and hickory shad for clear water. The average life of fish in Texas is two years. When they die their decomposing bodies may cause algae blooms — a suggested argument in favor of allowing fishing in reservoirs to remove the full-grown fish.

E. A. Sigworth—"Taste and Odor Control"; *Journal New England Water Works Ass'n*, September.

Unaccounted-for Water at Long Beach

During 20 years Long Beach, Calif., 300,000 population, has had an average of 5.1% unaccounted-for water. This low figure is due to several favorable natural conditions, good management and the use of the latest equipment and techniques. Natural advantages include a climate where freezing is unknown; a soft, non-corrosive well water; a compact distribution system; no open reservoirs (all reservoirs are steel tanks); the soil is such that leaks show quickly at the surface. On the other hand, light earthquakes are common; parts of the city are rising and other parts are settling—as much as 9 ft. in one district; lowering of the water table has necessitated obtaining from another source a water that is quite corrosive and aggressive. The last has been partly overcome by use of Calgon. Cast-iron is laid in non-corrosive soils, or surrounded by sand if the soil is corrosive. In corrosive soils, however, asbestos-cement pipe is generally used.

The output of each well is metered, as is the pumpage, and the two checked against each other. All services are metered and read monthly, and meters are tested where inaccuracy is suspected and repaired if more than 20% off on ¼ gpm flow. Compressed air is used freely in the meter shop; among other purposes for removing nuts, blowing dirt out of registers and

drying them. Meter chambers are cleaned by use of Oakite. Fire lines are either metered or protected by detector checks.

Walter M. Brown—"Low Percentage of Long Beach Water Is Unaccounted For"; *Water Works Engineering*, September.

BIBLIOGRAPHY

American City

Four-Phase Fire Protection Will Guard New Nottingham Filtration Plant. By *W. E. Morgan, Jr.*, Walter Kidde & Co. October, Pp. 86-87.

Fort Worth's Ten-Year Waterworks Program. October, Pp. 98-100.

New Filter Plant at Phoenix Works Part-Time. October, Pp. 102-103.

Am. Soc. of Civil Engineers Journal

Water Supply Engineering: Report of Committee for two years 1947-1948. September, Pp. 971-994.

Civil Engineering

Metropolitan Water District (of So. Calif.) Doubles Capacity of La Verne Softening and Filtration Plant. By *R. B. Diemer*, Engr. Met. Water Dist. October, Pp. 17-21.

Nevada Utilizes Modern Methods in Forecasting Runoff from Snow Cover. By *Kristian Tonning*, Dept. of C. E., Univ. of Nevada. October, Pp. 22-23.

Engineering News-Record

Artificially Recharged Wells City Water for Richland, Wash. By *L. L. Wise*, Asst. Editor. Sept. 15, Pp. 42-44.

Twice as Much Water for Cincinnati. *R. E. Duhme*, Asst. Supt. of W. W. Se tember 22, Pp. 30-32.

New Casting and Prestressing Techniqu for Ultra-Strong Concrete Pipe. Oct Pp. 24-26.

New England Water Works Ass'n Journal

Solving a Difficult Clarification Problem Kennebunk, Maine. By *M. Lane*, Gra Water Conditioning Co., and *L. Smith*, Supt. Water Dist. September, P 209-220.

Drought Runoff in New England. *Charles E. Knox*, Hydraulic Engr., U Geological Survey. September, Pp. 2 231.

The Case for Water Witching. By *Linco W. Ryder*, Metcalf & Eddy. Septembe Pp. 232-237.

Taste and Odor Control. By *E. A. Si worth*, Ind. Chem. Sales. September, P 238-249.

Power in New England. By *Byron McCoy*, Hydraulic Engr. September, P 250-276.

Sanitary Engineering in the Occup Zone of Germany. By *Alvin F. Mey* Act. Chf. Preventive Medical Sectio U. S. A. September, Pp. 277-286.

New Year's Flood of 1949 in Weste Massachusetts. By *Angelo Iantosc* Mass. Dept. of Public Health. Septe ber, Pp. 287-296.

Effects of Municipal Water Treatment Boiler Water Conditioning. By *J. Welsh*. September, Pp. 297-310

Public Works

Design, Construction and Uses of P stressed Concrete Tanks. By *Curzon D bell*, V. P. Preload Enterprises, I October, Pp. 45-48.

Drilling the Deepest Water Well in Il nois. By *Edward Hand*, City Cle Oglesby, Ill. October, Pp. 45, 52.

Southwest Water Works Journal

Rapid Sand Filter Design and Main nance. By *A. H. Ullrich*, Supt. Water Sewage Treat., Austin, Tex. Octob Pp. 18, 60, 62, 64, 66.

Technique de l'Eau

Une Annee d'Experience en Microfiltr tion. By *M. F. P. Hornby* and *E. Thomas*, September, Pp. 19-28.

Water and Sewage Works

Installation of Low-Head Pumps. By *Rob W. Angus*, Consult. Engr. October, P 376-380.

Rapid Sand Filter Design and Maint nance. By *A. H. Ullrich*, Supt. Water Sew. Treat., Austin, Tex. October, P 381-384.

Operation of Small Water Plants: Billi and Collecting. By *A. E. Clark*, Ge Mgr., Nashville Sub. Utility Dist. Oct ber, Pp. 385-387.

New York's 40-Year Old Infiltration Ga leries. October, Pp. 388-389.

Obtaining a Rate Increase. By *Chas. Alfke*, Exec. V. P. Hackensack Wat Co. October, P. 390.

Rapid Methods for Total Hardness Water. By *J. R. Rossum* and *Prim Villarruz*, Calif. Water Serv. Co. Oct ber, Pp. 391-392.

Water Works Engineering

Low Percentage of Long Beach Water Unaccounted For. By *Walter M. Brow* Of. Engr., Water Dept. September, P 810-814, 858.

Legality of Water Works Bonds. By *L T. Parker*. September, Pp. 815, 852.

Hundreds of Millions Required for Wat Works Improvements. September, P 816-817, 874.

How Two-Way Radio Is Used by Elyri O., Water Department. By *Thomas Flynn*, R.C.A. September, Pp. 819-820.

Suggestions for Water Chemists to Co serve Time and Equipment. By *F. Daniels*, Chf. Chemist, Pa. Dept. Health. September, Pp. 821-822, 864.

Placing New Intake on Broken Pip Twenty Feet Deep. By *R. S. Clark* Supt., Avon, New York. September, P 823-824, 834.

Pressure Reducing Valves. September, P 827-829, 837.

Relative Equities of Various Classificatio of Water Uses. By *Rolf Eliassen*, Prof. of San. Eng., M.I.T. September, Pp. 83 832.

Water Practices, Ossining, N. Y. By *Wa lace T. Miller*, W. W. Supt. October, P 916-920, 946.

Preventing Hydrants From Freezing. O tober, Pp. 927-928.

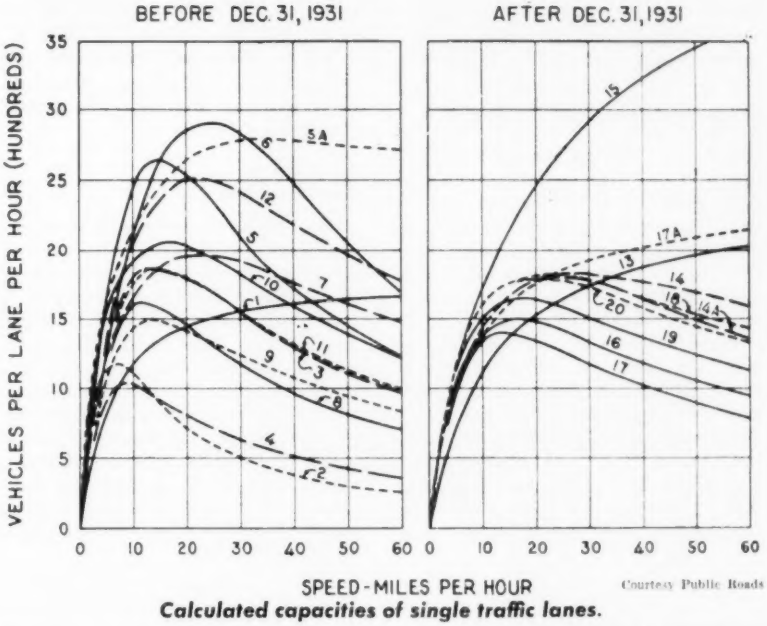
THE HIGHWAY and Airport Digest

PUBLIC WORKS DIGESTS

Determination of Highway Capacity

The cooperative efforts of the Bureau of Public Roads, the Highway Research Board Committee on Highway Capacity, and many State, county and city engineers, intensively applied in many places and for a number of years, have resulted in a great mass of field observations on traffic never before available for study. The data so collected have been assembled and carefully analyzed and form the basis of "a practical guide by which the engineer, having determined the essential facts, can design a new highway or revamp an old one with assurance that the resulting actual capacity will be as calculated." The 34 pages published in this issue of *Public Roads* will be followed in the next issue of a second half, after which the report will be reprinted in its entirety as a manual on highway capacity.

"Highway Capacity: Practical Applications of Research" — *Public Roads*, October.



Courtesy Public Roads

Calculated capacities of single traffic lanes.

Counties Maintain State Highways by Contract

Of the 83 counties in Michigan, 68 maintain the state highways within their boundaries by contract with the State Highway Dept. Where distance is a factor, the mileage of a 2-lane highway is the unit of payment, additional lanes being computed as additional mileage. The State pays at agreed rates for the labor, equipment rental and materials used, plus 6% for overhead. The State Highway Dept. retains supervisory control of the quality and timing of maintenance, as well as budgetary control.

Before entering into a contract, the State highway commission investigates the type of county organization, supervisory personnel and crew; financial condition of the county; its garages, warehouses, equipment and repair facilities, and the character of maintenance work being performed. The counties differ greatly, their personnel from 30 to 200 men, their mileage from 142 to 2,000, while the traffic on some county roads approaches that on State trunk lines, while in others there is very little traffic except that of summer tourists.

The system has been very successful and economical. It eliminates duplication of garages and supervisory personnel. The counties have to have more equipment and personnel, which is of benefit for county operations. The equipment depreciates more rapidly and so can be kept up to date. And the supervision of State engineers has the effect of improving county personnel and operations.

Ralph F. Swan — "Maintaining State Highways by Contract"; *PUBLIC WORKS*, October.

County Premixes Bituminous Patching Material

Racine Co., Wis., operates a modern mobile gravel plant which can produce over 500 cu. yd. daily in a pit requiring 65% reduction of material. An innovation this year is the preparation of large quantities of patching mix in a yard at one of the county garages and near a gravel plant, the working area being about 150 x 600 ft. Here the material is dumped in windrows by trucks, and part of a windrow spread by a motor grader into a layer 3" or 4" thick and 8 to 10 ft. wide. An asphalt distributor then spreads bitumen on this layer, and a grader spreads the rest of the material over that already sprayed. The distributor sprays more bitumen over the windrow, and graders make a succession of round trip passes until the mix is thoroughly homogeneous.

"Racine County Builds Road Program Around Modern Gravel Plant"; *Roads and Streets*, August.

The Radio in Highway Maintenance

Highway departments started using radio service in 1938. In 1948 California had 27 fixed stations and 50 mobile units. Washington has one of the most modern and comprehensive highway radiotelephone systems. Pennsylvania and Onondaga County, N. Y., use the system to great advantage. The author lists 24 uses made of this service, including snow and ice control; immediate repairs of dangerous pavements, bridges, broken traffic control devices; dispatching equipment and materials. Until recently only one usable radio frequency was assigned for use by all highway departments, and there was considerable interference, even between the States of New York and Washington. In 1945

the A.A.S.H.O. appointed a Committee on Use of Radio in Highway Departments; to obtain from the Federal Communications Commission revision of its regulations and assignment of more frequencies for use by highway departments, and the Commission made revisions effective July 1, 1949, which provide 14 additional frequencies for use by States for highway maintenance, authorizing them to transmit communications "directly relating to Public Safety and the protection of life or property" and those essential to official activities directly relating to the maintenance, supervision and operation of public highways. The A. A. S. H. O. committee has been asked by the Commission to develop a plan for assigning these frequencies, to be recommended to it. All radio stations, both fixed and mobile, must be authorized by the F.C.C.

Manufacturers of radio equipment are now offering units that are more serviceable and compact and provide greater voice fidelity than those previously available. At present, three types of radio service are available: 1—Commercial service furnished by communication companies on a rental basis, land stations at $40 to $60 a month and mobile units at $20. 2—"Suburban radio-phone service"—mobile equipment by which an automobile driver can communicate by radio with a telephone central office, which will forward the message by telephone. 3—Privately owned radio systems, the highway department purchasing all the equipment outright. Land stations cost $500 to $1,000, mobile units cost $450 to $550.

Warren K. Myers—"Problems and Advantages of Radio in Highway Maintenance Efficiency"; *Traffic Quarterly*, October.

Clearing a Reservoir Site

Work is now proceeding on clearing 17 sq. mi. of the area to be covered by water behind Allatoona dam in northern Georgia. This area is typical mountain valley land. Many steep, rocky cliffs and swales made use of portable disc saws impracticable. Trees and brush less than 4" diameter are cut flush with the ground, trees up to 24" diameter 1 ft. above the ground, and larger ones 2 ft. above the ground. This summer the contractor was using 255 men and 30 diesel tractors equipped with rakes or forks mounted on hydraulic cable-operated dozer frames. Brush cutting is done with hand brush axes, followed by gasoline-powered chain saws for trees. Several hundred feet back of these, for safety a decking crew uses tractors to doze the brush into piles some 100 ft apart for burning, and winch lines to snag felled trees out of swamps or inaccessible places. In a few days the piles are burned, the unburned edges being later dozed into new piles for final burning. Clearing has averaged 20 to 30 acres per 9 hr day.

"Clearing Methods Used at Allatoona Reservoir"; *Roads and Streets*, September.

Hard Surfacing Equipment Parts

Replying to a questionnaire on the desirability, practicability and economy of hard-surfacing highway equipment in small shops, nine highway officials express the general opinion that it is desirable, with certain qualifications in some cases. Hard surfacing is applied to dipper scarifier and rooter teeth, bulldozer blades, parts of rock crushers, snow plow shoes, tractor sprockets, etc.

One county engineer hard-faces the track cleats of new crawler tractors before they are used at all. Another finds it cheaper to replace removable grader bits and bucket-tooth points than to built them up. Several state that any manufacturer of welding equipment or welding rods will gladly instruct a mechanic in hard-surfacing methods.

"Hard Surfacing of Equipment Parts"; *Better Roads*, September.

Testing Traffic Paints

A committee of the Am. Soc. for Testing Materials has studied the matter of bleeding of traffic paints, "bleeding" being defined as "the diffusion of coloring matter through a coating from the substrate; also the discoloration arising from such diffusion." A simple laboratory test for evaluating the resistance of traffic paint to bleeding has been developed, based on the application of the paint to tar paper, and also one substituting a film of ester gum and liquid coal tar for the tar paper. It was found that coal tar surfaces bleed much more severely than do asphaltic or oiled surfaces; that no paint that was tested is truly 100% bleed resistant over coal tar, and that bleeding intensity varies directly with the percentage of aromatic hydrocarbon in the solvent and also decreases as the evaporation rate of the solvent increases.

Fred S. Byerly—"Laboratory Testing of Resistance of Traffic Paint to Bleeding"; A. S. T. M. Bulletin, September.

BIBLIOGRAPHY

American City

How Minneapolis Maintains Dirt Streets. By *Elmer H. Lund*, Supt. Street Maint. October, P. 129.

A.S.T.M. Bulletin

Laboratory Testing of Resistance of Traffic Paint to Bleeding. By *Fred S. Byerly*, U. S. Industrial Chemicals. September, Pp. 52-56.

Better Roads

Shirley Memorial a Model of High-Type Design. By *R. I. Mount*, Dist. Engr., Virginia Dept. of H'ways. September, Pp. 19-20, 33.

How Connecticut Combats Snow and Ice. By *G. Albert Hill*, State H'way Com'r. September, Pp. 21-23,35.

Federal-Aid Secondary Progress. September, Pp. 24-26, 33.

Blowing Sand a Highway Problem. By *Tarleton A. Jenkins*, U. S. Soil Conservation Service. September, Pp. 37-38.

Civil Engineering

Aerial Survey Methods Solve Highway Location Problems in Tropics. By *William T. Pryor*, H'way Engr., B.P.R. October, Pp. 40-44.

Contractors Record (England)

Municipal Plant and Manpower. By *R. Gordon Hughes*. Sept. 21, Pp. 19-25.

Engineering News-Record

Subsurface Road Conditions Revealed by Geophysical Methods. By *F. W. Cron* and *R. Woodward Moore*, Engrs., B.P.R. Oct. 13, Pp. 40-44.

Public Roads

Highway Capacity: Practical Applications of Research. By Committee on Highway Capacity, Highway Research Board. October, Pp. 201-235.

Public Works

Economy in Airport Design. By *Edward Payson Hall*, Airport Consultant. October, Pp. 38-40.

Maintaining State Highways by Contract. By *Ralph F. Swan*, Mich. State H'way Dept. October, Pp. 53-54.

Roads and Streets

Coarse Ground Cement and Puzzolanic Additions. By *W. J. Arndt*, Asst. Engr., Kansas H'way Com'n. September, Pp. 48-52, 74.

Skillful Scraper Work, Vibratory Compaction, Speed Grading at Detroit Wayne Airport. September, Pp. 53-57.

Cost Estimating for Owners of Power Excavators. September, Pp. 58, 62, 64, 66.

Sampling and Testing Aggregate Plant Output in New Mexico. By *E. B. Ball*, Engr. New Mexico H'way Dept. September, Pp. 77-79, 85.

Traffic Quarterly

Problems and Advantages of Radio in Highway Maintenance Efficiency. By *Warren K. Myers*, Chf. Maint. Engr., Penn. Dept. of H'ways. October, Pp. 308-320.

PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Disposal of Radioactive Wastes

On the basis of experience and fundamental studies of the trickling filter and activated sludge processes, it seems that a modification of the activated sludge process is most promising for treatment of wastes from nuclear fission operations. It was demonstrated at Los Alamos that more than 95% of a long half-life alpha emitter in concentrations up to 1.4 micrograms per liter may be removed from the liquor and transferred to the zoogleal sludge by aeration with activated sludge. A well operating two-stage, counter current flow, zoogleal floc process can be expected to remove 99% of the plutonium from wastes and produce an effluent that should approach a tolerance limit of 0.001 microgram per liter. Studies on the various phases of this problem are underway at Oak Ridge, Tenn., Los Alamos and Cincinnati.

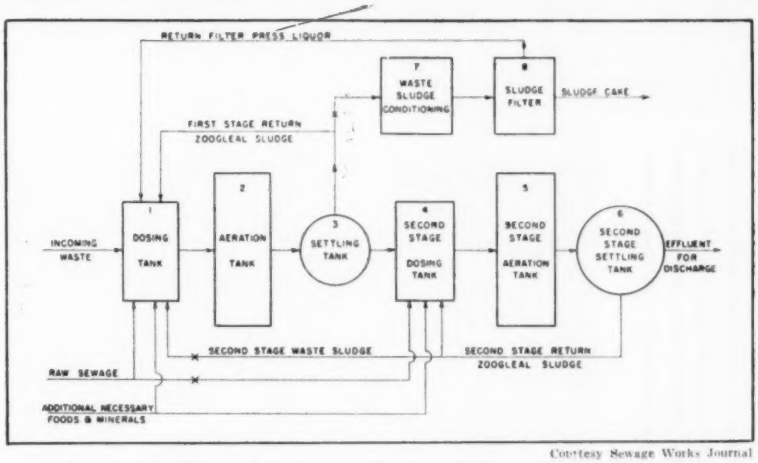
C. C. Ruchhoft—"The Possibilities of Disposal of Radioactive Wastes by Biological Treatment Methods"; *Sewage Works Journal*, September.

Chlorination in Sewage Treatment

Chlorine is used up-sewer, to the influent at the plant, and at various out points in the plant as an aid to settling, for odor control, to prevent sludge bulking, for B.O.D. reduction, for controlling filter flies and ponding, controlling Imhoff tank foaming, and in plant effluents to reduce B.O.D. and kill pathogenic bacteria.

Used up-sewer, preferably at several points, it checks the production of odors and the formation of concrete-attacking sulphuric acid, and ensures the arrival at the plant of fresher sewage. The amount used for this purpose varies from 5 to 50 ppm. It is best applied on a program basis, a timing device increasing or decreasing the dosage at certain specific time intervals in accordance with a prearranged schedule complying with known variations in sewage strengths and flow. For prechlorination also, program control superimposed on flow control is desirable. Biological plants usually operate well if the ORP is on the oxidizing side, and chlorination can effect this automatically by means of a cell which, when the potential drops below a predetermined point, actuates the chlorinator to apply more chlorine—the system being called "potential chlorination." Chlorination of supernatant liquor from digesters reduces the troubles caused by returning it to the primary settling tank. The dosages used for chlorinating crude sewage vary from 6 to 25 ppm., settled sewage 5 to 40 ppm (the higher dosage for septic sewage); for trickling filter effluent 3 to 10 ppm; activated sludge effluent 2 to 8 ppm; intermittent sand filters 1 to 5 ppm. These dosages are calculated to give a residual of 0.2 ppm.

A. E. Griffin—"How to Plan Effective Sewage Chlorination"; *Public Works*, October.



Courtesy Sewage Works Journal

Suggested flow diagram for nuclear waste treatment plant.

East Bay Intercepting Sewers

The 20 miles of intercepting sewers that form part of the sewerage program for the six East Bay (San Francisco Bay) cities include concrete pipe from 18" to 108" diameter. The pipes are cast centrifugally in 8 ft. lengths, using Type II cement with a calcined reactive siliceous admixture to give the concrete greater density and resistance to deterioration by sewer gas and by chemical reaction with the surrounding soil. The pipes are supported by a continuous cradle; 12" of crushed rock is spread on the bottom of the trench, precast concrete blocks set to grade on this to support the pipes; and after the pipes have been placed, a cradle of concrete is poured 12" thick below the pipe and 9" on the sides up to the spring line. Where the soil is a sticky gumbo, imported sand is used for backfill.

"Interceptors Come First in California Sewage Plan"; *Engineering News-Record*, Sept. 15.

Filtering Sewage Plant Effluents

Experiments have been conducted by the Water Pollution Research Laboratory of England on filtration of the final effluents from sewage treatment, using rapid sand filters with sand and with anthracite media, and micro-strainers. Filter rate of 100 gal. per sq. ft. per hr. was used. The effluents from sand and from anthracite were practically identical. The latter ran a little longer than sand before the head reached 8 ft. and back-washing became necessary. The suspended solids in the effluent were nearly always less than 5 ppm, showing 67 to 92% reduction by the filters, and the B.O.D. reduction was 47 to 78%. They could not be relied upon to produce an effluent of good bacterial quality. Tests were made also of a micro-strainer—a horizontal drum

of woven stainless steel fabric rotated on a horizontal axis. One end of the drum was open and the sewage entered here and flowed out through the strainer fabric. The matter retained inside the fabric was washed off continuously into an outlet trough. Two grades of fabric were tried, one with 58,000 apertures per sq. in., the other with 100,000. Only 9" head of water was required. The coarser fabric gave 61 to 73% reduction of suspended matter and 31 to 46% of B.O.D. With the finer fabric the results were somewhat better, and experiments with it are being continued.

A. E. J. Pettet, W. E. Collett and T. H. Summers—"Mechanical Filtration of Sewage Effluents"; *The Surveyor*, Sept. 30.

Fertilizer From Sludge at Houston

Houston, Tex., is enlarging and improving its sewage treatment facilities, including a plant for the manufacture of fertilizer from the sludge from two activated sludge plants. It is estimated that by 1970 the average annual quantity of dry solids will be 71 tons a day. The method of disposing of the sludge recommended by Greeley & Hansen is by dewatering and heat drying. Sludge will be pumped from one plant through 36,000 ft. of 8" pipe to the other plant, where will be located 4 vacuum filters of 570 sq. ft. each; a drying plant with 2 flash dryers, each capable of evaporating 12,000 lb. of water per hour; and the necessary conveyors, screens and grinders for preparing fertilizer. Ferric sulphate will probably be used as the conditioner as it is the lowest-cost one now available in Houston. Lagoons are provided to take care of peak loads and eliminate the necessity for standby equipment. The estimated annual operating cost is $261,020 and debt service $64,400. It is expected to sell 21,000 tons of fertilizer a year. If this is sold at $12.25 a ton the revenue will be $268,000. (The city now is selling fertilizer at $17.25 per ton).

J. G. Turney — "Sludge Disposal at Houston, Texas"; *Sewage Works Journal*, September.

Protozoa and Bacteria in Activated Sludge

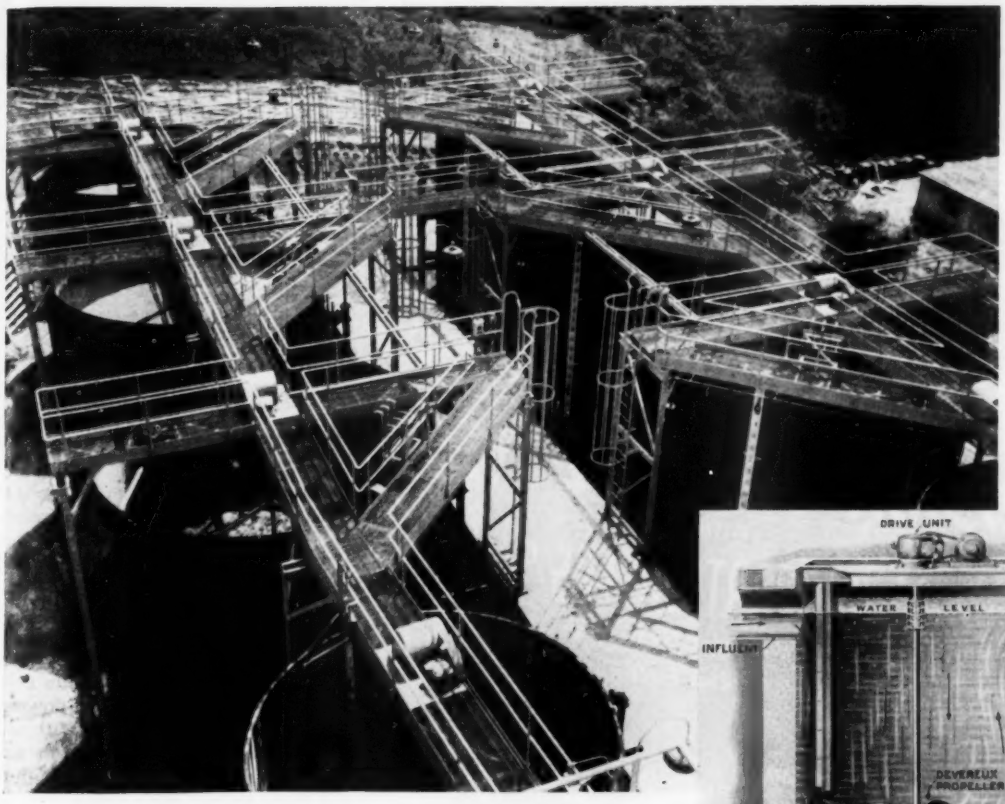
Protozoa in activated sludge are inactivated by high-speed mechanical agitation, by heating the sludge to 50° C, by freezing, by methylene blue in high concentrations, by treatment with silver and chlorine. At the same time there is an apparent increase in the numbers of bacteria in the case of agitation; in heating and in treating with silver and chlorine there is an initial decrease in bacterial numbers, but they increase upon aerating the sewage while the protozoa remain inactive; the methylene blue reduces bacterial numbers. Protozoa assist in clarification and appear to aid purification but are secondary to bacteria in importance.

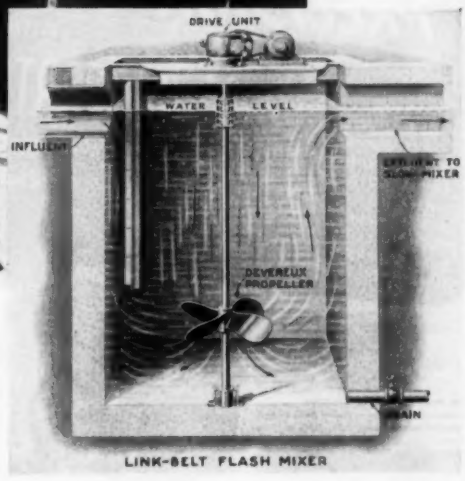
H. Heukelekian and M. Gurbaxani —"Effect of Certain Physical and Chemical Agents on the Bacteria and Protozoa of Activated Sludge"; *Sewage Works Journal*, September.

Effect of Sea Water on Biochemical Oxidation

Experiments made by the author indicated that the rate of biological oxidation k is larger in low concentrations of sea water (up to about 25%) than in fresh water; but as the concentration of sea water is increased, k decreases until in straight sea water it is less than in fresh water. Sea water does not significantly affect the magnitude of the first stage of biochemical oxidation

Toxic Waste Water Made Harmless





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Efficient Flash Mixers and Thickener Remove Metals and Cyanides

Elaborate metal working operations at the Meadville, Pa., plant of Talon, Inc., produce an average of 90,000 gallons of waste water daily, which must be treated to remove toxic elements, prior to discharge into nearby French Creek. Link-Belt equipment developed through broad experience in industrial and sewage treatment plants of every kind, provide thorough mixing of treatment chemicals, and removal of sludge, producing a crystal clear effluent.

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Link-Belt experience in the design of equipment for the treatment of water, sewage and industrial liquids is the broadest, and equipment developed by Link-Belt engineers comprises most every item required for complete results. Link-Belt engineers welcome your inquiries.

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of sewage, but the second stage is retarded. The lag period of the first stage of oxidation at low temperatures is usually shorter in water containing some sea water than in fresh waters.

Harold B. Gotaas—"The Effect of Sea Water on the Biochemical Oxidation of Sewage"; *Sewage Works Journal*, September.

Treating Oil Wastes

The Aluminum Co. of America has placed in operation at its Davenport, Ia., rolling mill a plant for treating its oil wastes to prevent pollution of the Mississippi river. Batches of as much as 150,000 gal. are discharged at intervals, containing 2 to 10% of soluble oils as emulsions. These wastes flow into a wet well, where a portion of the floating oil and grease may be skimmed off, and then is pumped to a 250,000 gal. elevated storage tank, from which it flows by gravity to a two-story tank, the upper one of rubber-lined steel, the lower of concrete. Filter alum is mixed rapidly with the waste water as it flows into the upper tank, which has a 1½ hr. detention. Skimmers were provided for removing de-emulsified floating oil from this tank, but so far there has been none to remove. The overflow from this tank is alkalinized by addition of lime and flows into the lower tank, where gravitational separation takes place during 4-hour sedimentation. Dosages of 7 grains per gallon of alum and 10 of lime produced best results. Sludge is removed to a hopper at one end of the tank by an endless chain sludge collector and pumped to a lagoon. As small quantities of oil are released from the sludge in the lagoon they are drawn off and returned to the wet well. The plant effluent is slightly turbid, with no indications of floating oil or oily films.

W. B. McMorris—"How to Avoid Oil-Waste Pollution"; *Engineering News-Record*, Sept. 29.

State Stream Pollution Laws

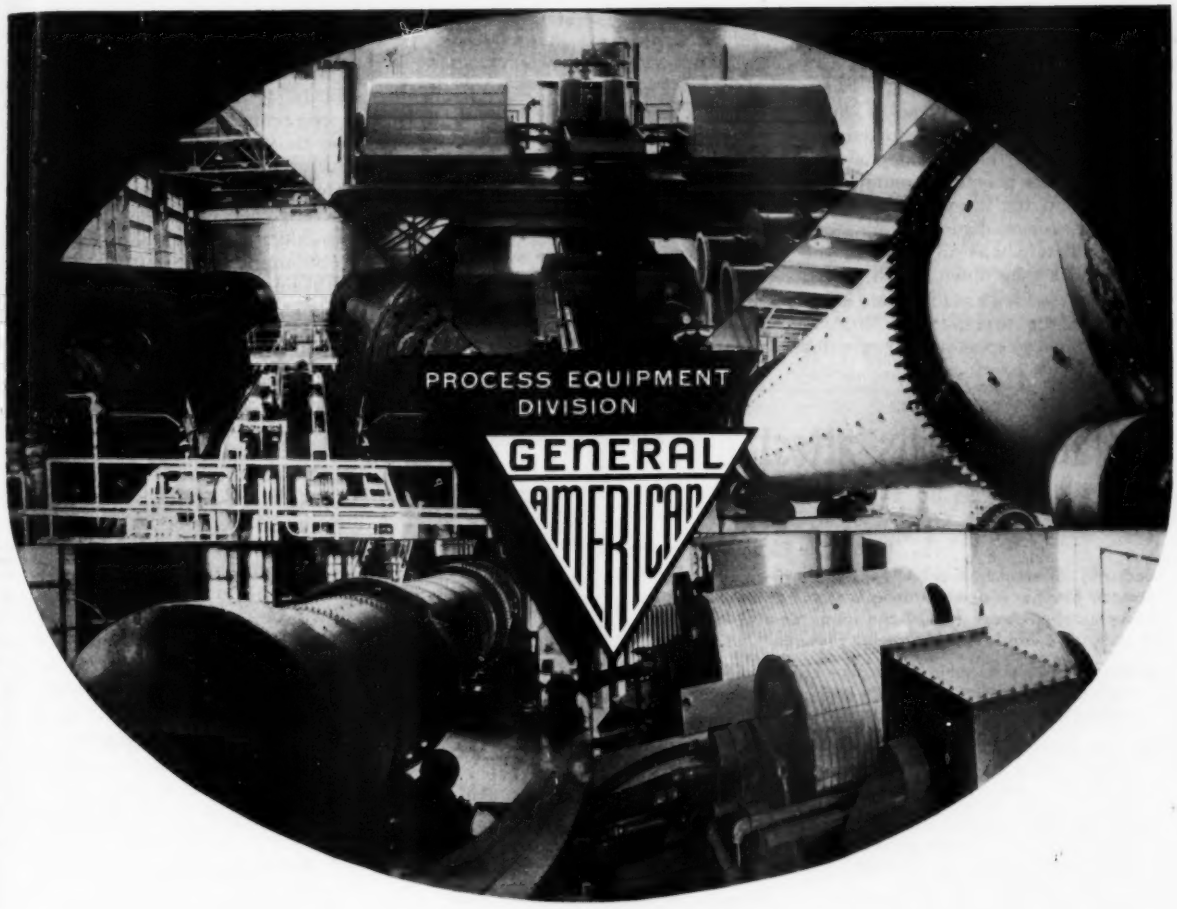
"The only reason there aren't 48 distinctly different state stream-pollution-abatement laws is that several states have no law at all." Such laws exist in 41 states, 27 of them enacted or amended in the postwar period. Separate agencies to administer the laws have been set up by 26 states, with many designations and greatly varying powers: some only advisory, others with authority to see that regulations are carried out. Punishment for polluting state waters after being ordered to cease varies from none to a maximum of $3,000 per day of violation and jail terms up to one year. At present, 24 states are cooperating in regional compacts to control conditions of streams running across or along state lines; there being 11 formal interstate compacts and several informal agreements. Minnesota is a party to 5 such compacts, New York to 4, Pennsylvania to 4, Illinois to 4, Wisconsin to 3, Missouri to 3, Indiana to 3, and several to 2 compacts.

A. J. Fox, Jr.—"Pollution Abatement Laws Present Confusing Picture"; *Engineering News-Record*. Sept. 15.

A Study of Bio-Precipitation

The term "bio-precipitation" has been applied to a process whereby all the oxygen required is carried into an activated sludge tank by preoxygenated sewage, which is able to contain 4 to 5 times as much oxygen gas as it can oxygen in air. (See the *Sewerage Digest* for June, 1948). A laboratory investigation, using tonnage oxygen (about 95% purity) was conducted by the au-

When you need special information—consult READERS' SERVICE DEPT. on pages 65-69.



Modern Sewage Treatment Plants

require equipment that has proved itself efficient and is backed by individual responsibility for design, engineering, fabrication and initial operation.

General American Conkey Sludge Filters—the first to be used for large scale dewatering of sludges such as primary, elutriated-digested, Guggenheim Process, etc.—are dewatering more than a thousand tons of dry solids daily.

General American Louisville Dryers have been successfully used for years drying both activated and digested sludges. Type "L", with patented fire-conduits to eliminate scorching or burning, produces a uniformly high quality maximum yield of dried product for fertilizer or earth conditioner.

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thor, from which he concluded that consideration of bio-precipitation, using low-cost tonnage oxygen as a means for sewage treatment, is warranted, as offering three-to four-fold savings in plant requirements over those for the activated sludge process, with greater economies to be expected for intermediate treatment of sewage. Oxygen from standard cylinders was admitted at the bottom of a tube down which flowed sewage mixed with recirculated effluent from the precipitation unit. A sludge density considerably greater than with air is obtained and more solids can be carried in the system and therefore the period can be shortened. Biological properties of the sludge remained excellent, with little Sphaerotilus and no gas-lifted sludge due to nitrates. Loadings suggest the rates may be four times normal values. No attempt was made to develop a design for an operating plant for utilizing this process.

Daniel A. Okun—"System of Bio-precipation of Organic Matter from Sewage"; *Sewage Works Journal*, September.

Oil Scrubbing For Odor Control

Waste activated sludge at the Wards Island treatment plant is stored temporarily in a closed building, the air in which becomes very foul and is deodorized by ozonation before being released to the atmosphere. Experiments have shown that the odors can also be removed by scrubbing the air with alkalies or with light oils of the kerosene or diesel oil type. In the scrubber the foul air, rotating rapidly in a cylindrical chamber, comes in contact with a spray or fog of fine liquid, which absorbs the odors and is drawn off. No. 3 diesel fuel oil was used, a small quantity of naphthalene being added to reduce the evaporation of the diesel oil and permit a larger amount of air to be treated per unit of oil. The loss of oil by evaporation amounts to about 2 gal. per million cubic feet of air scrubbed. The spent oil can be used as diesel engine fuel.

Gail P. Edwards—"Sludge Odor Control by Diesel Oil Scrubbing"; *Sewage Works Journal*"; September.

BIBLIOGRAPHY

American City

Sewage Treatment Plant to Be Odor-Free. By *Don Hull McCreery*, Quinton Engrs. October, Pp. 92-93.

Contractors Record (England)

The Bio-Phage Nutrient Process of Sewage Treatment. By *F. P. Fischer*, Wallace & Tiernan. Sept. 28, Pp. 11-12, 14.
City of Paris Sewage Treatment Plant. Sept. 28, Pp. 16.

Engineering News-Record

Pollution Abatement Laws Present Confusing Picture. By *A. J. Fox, Jr.*, Asst. Editor. Sept. 15, Pp. 23, 28.
Interceptors Come First in California Sewage Plan. Sept. 15, Pp. 38-41.
Sewage and Garbage Disposal at Richland, Wash. By *L. L. Wise*. Sept. 22, Pp. 24-25.
Honolulu Builds Sewer Inside Out. By *George C. Wallace*, Engr. of Sewers. Sept. 29, P. 35.
How to Avoid Oil-Waste Pollution. By *W. B. McMorris*, Engr. Aluminum Co. of America. Sept. 29, Pp. 42-43.
Gaging Wire Tension in Prestressed Tanks. Oct. 6, Pp. 33-34.

Public Works

How to Plan Effective Sewage Chlorination. By *A. E. Griffin*, Wallace & Tiernan Co. October, Pp. 35-37, 48.
Industrial Waste Data. October, Pp. 41-44.
Reclaiming Water from Sewage. October, Pp. 56-58.
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How Copper Sulphate Is Used for Root Control in Sewers. By *John W. Hood*, Supt. of Sew. Treat., Ridgewood, N. J. October, Pp. 62, 64.

Sewage Works Engineering

Sedimentation-Chlorination Protect Connecticut Shore. By *Warren J. Scott*, Dir. Bureau of San. Eng. October, Pp. 479-480.
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Variable Effects of Aeration on Settling of Activated Sludge. By *W. E. Abbott*, Chem., Nottingham Sew. Disp. Dept. October, P. 509.

Sewage Works Journal

System of Bio-Precipitation of Organic Matter from Sewage. By *Daniel A. Okun*, Consult. Engr. September, Pp. 763-794.
Sludge Odor Control by Diesel Oil Scrubbing. By *Gail P. Edwards*, Chf. of Lab., Dept. of Pub. Wks., New York City. September, Pp. 795-798.
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Interesting Extracts from Operation Reports of Cleveland, O. By *Walter E. Gerdel, John O. Barrett, G. E. Flower*. September, Pp. 902-910.
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Protective Paints and Coatings for Sewage Treatment Plants. By Frederick V. *Kroeber*, Inertol Co., September, Pp. 913-917.

The Surveyor

Mechanical Filtration of Sewage Effluents. By *A. E. J. Pettet, W. F. Collett* and *T. H. Summers*. Sept. 30, Pp. 581-584.

Technique Sanitaire et Municipale (France)

Les Lecons de Quelques Epidemies de Maladies d'Origine Hydrique. By *M. Andre Le Strat*, Supt. of Water, Paris. July-Aug., Pp. 107-112.

Water and Sewage Works

Design, Operation and Maintenance of Small Sewage Works. By *R. W. Simpson*, San. Engr. October, Pp. 365-370.
First Magnetic Drives for Sewage Pumps. By *Herbert J. Meeker*, Worthington Pump & Mach. Corp. October, Pp. 372-375.
Industrial Use of Sewage Effluents.. By *H. W. Whitney*, City Mgr., Big Springs, Tex. October, Pp. 393-395.
Reducing Costs by Use of Modern Equipment. By *Reuben F. Brown*, Supt of Sanitation, Los Angeles, Calif. October, Pp. 396-397.
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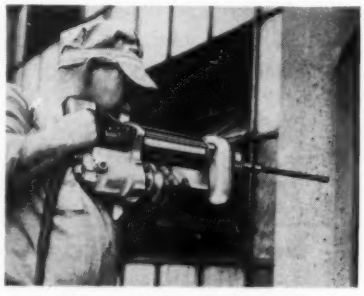

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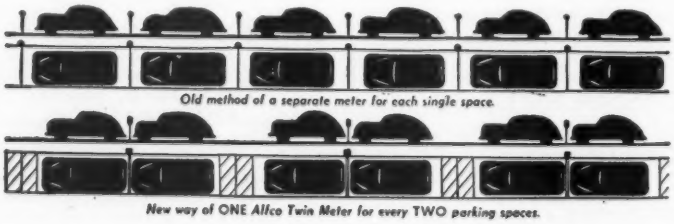

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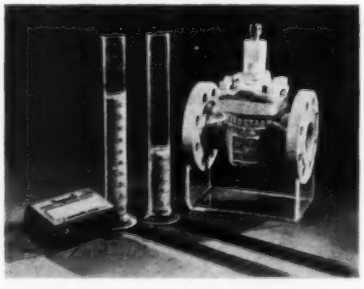

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Kettle for Rubberized Asphalt and Sealers

This new 50-gal. kettle has been developed especially for the better melting and heating of rubberized asphalts. It has a double boiler system, using 40 gals. of heat bath oil which assures uniform heating without burning. It has a single burner, and accurate thermostatic controls, ranging from 100° to 550°, by a calibrated dial. Available as trailer or on skids. Aeroil Products Co., South Hackensack, N. J. For full information, use the coupon.

Use coupon on page 65; circle No. 11-8

A Saw for Cutting Cast Iron Pipe and Other Materials

This saw, using a new type of abrasive wheel, cuts cast iron pipe quickly, and also cuts any kind of

Cuts pipe, ceramics or concrete.

metal, ceramic or plastic material, as tile, concrete pipe, brick, cement or cinder blocks. It will cut at any angle up to 45°. Will handle any size of pipe, and is available in four sizes. Data from Porter-Cable Machine Co., Syracuse 8, N. Y., or use the coupon.

Use coupon on page 65; circle No. 11-9

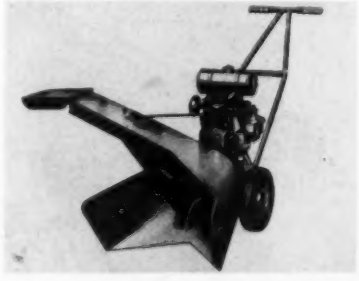
Sludge Dewatering With a Pilot Plant

A string discharge vacuum sludge filter having a 3-ft. diameter drum 1 ft. wide, providing approximately 10 sq. ft. of filter area, is available as a pilot plant or for rental. This unit gives any community an opportunity to test out the advantages of vacuum filtration in sludge disposal. For information on this unit, write Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. J., or use the coupon.

Use coupon on page 65; circle No. 11-10

Snow Removal From Sidewalks

Here is something we'd like to try on our own sidewalk. This machine clears a path 16 ins. wide and, by means of a multi-blade impeller, throws the snow 25 ft. away, more or less, as the operator desires. It will easily handle snow up to 12 ins. deep; with practice, the operator can handle deeper snow. Descrip-



Takes snow off walks.

tive pamphlet from Sensation Mower, Inc., Ralston, Nebr., on request, or use the coupon.

Use coupon on page 65; circle No. 11-11

Higher Power-Performance Ratings for IHC Diesel Tractors

Two International diesel crawler tractors now have higher power performance ratings. These are the

More powerful tractors.

TD-18A and the TD-14A. The former now has 87 drawbar horsepower and 107 at the flywheel. Drawbar pull in first gear is 22,400 lbs. The TD-14A now has 60.5 drawbar and 76 flywheel horsepower with a maximum drawbar pull of 16,600 lbs. Both models have other improvements which are described in new specification sheets and catalogs available from Consumer Relations Department, International Harvester Co., 180 N. Michigan Ave., Chicago, Ill., or by using the coupon.

Use coupon on page 65; circle No. 11-12

Haydite Light-Weight Concrete Blocks

Haydite is a manufactured stone, remarkably light in weight and chemically inert. Mixed with portland cement, it produces a strong and highly fire-resistant concrete, which can be made into low weight blocks for any construction purpose. Two excellent folders are available which give dimensions, uses, data on heat and sound transmission, strength, fire resistance and use in construction. Write for these to Carter-Waters Corp., 2440 Pennway, Kansas City 8, Mo., or use coupon.

Use coupon on page 65; circle No. 11-13

Speedier Operation With Fluid Drive

The Chrysler fluid drive has been adapted to the Model "C" Wagnermobile scoop for fast and convenient operation. This unit is made with scoops of five different sizes and with many other attachments, including a ¾-yd. concrete hopper, a crane boom, and lift forks. Load

Fluid drive scoop.

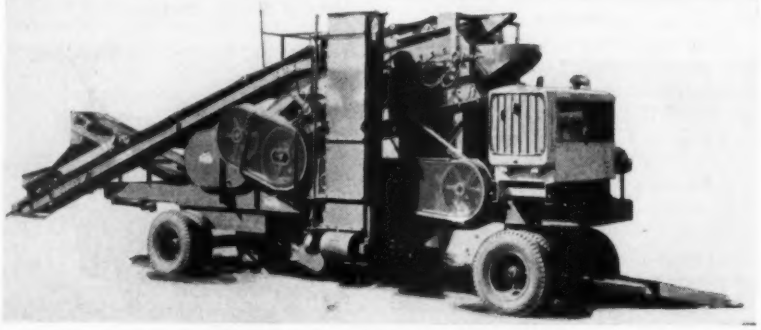
lifting capacity is 4,000 lbs. The unit has power steering, hydraulic controls and a 114-hp. engine. Mixermobile Mfrs., 6855 N. E. Halsey St., Portland 16, Oregon.

Use coupon on page 65; circle No. 11-14

Small Portable Gravel Crushing and Screening Plant

This highly portable unit, the 17-V has a 10 x 16 jaw crusher and a 24 x 30 roll crusher, with a 30" by 8', 3½ deck vibrator screen giving 40 sq. ft. of effective screening area. The chassis is 2-axle, with four tires front and rear. All drives are either V-belt or tumbler shaft and gear box. Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn.

Use coupon on page 65; circle No. 11-15



Pioneer Portable Gravel Plant.

Cuts Steel Rods and Wire Rope

Weighing only 40 pounds, this portable hydraulic hand tool will cut wire rope up to 1¼-inch and mild steel rods up to ¾-inch. Or it can be adapted with special blades for cutting mild steel to 1-inch and reinforcing rods to ¾-inch. Operation is by hand pumping and is easy. Ask for Bulletin G10 from Manco Mfg. Co., Bradley, Ill., or use the coupon.

Use coupon on page 65; circle No. 11-16

Holding Down Under-Water Pipe

A concrete weight that is easy to handle and economical to install, yet is efficient in weighting down under-water pipe, has been developed by Universal Concrete Pipe Co., Columbus, O., and can be supplied from any of 15 plant locations. The weights are of rounded construction; have a special lifting hole; and are in two sections which are bolted together after encircling the pipe. Handling and placing is easy and they permit the pipe to roll or twist while being handled.

Use coupon on page 65; circle No. 11-17

PERSONALS

L. F. Warrick, who has been state sanitary engineer of Wisconsin since 1927 has resigned to become Sanitary engineer in charge of Technical Services under the Division of Water Pollution of the U. S. Public Health Service. O. E. Muegge will succeed Mr. Warrick in Wisconsin.

W. W. Towne, long-time state sanitary engineer of South Dakota, has resigned to join the staff of the U. S. Public Health Service, and will have headquarters in Cincinnati.

Capt. John C. Gebhard (CEC, USN, Ret.) has joined the faculty of the School of Civil Engineering of Cornell University, Ithaca, N. Y., as assistant professor of Civil Engineering.

Michael J. Stankewich, formerly a sanitary engineer with the New York State Department of Health and an officer of the Sanitary Corps during World War II, has been appointed chief engineer of the Bureau of Water and Sewage Control Engineering of the Erie Co., N. Y. Health Department, which includes the city of Buffalo.

ARBA

American Road Builders' Association will hold its 47th annual meeting at Cincinnati, Ohio, March 6 to 9. Headquarters will be at the Netherlands Plaza Hotel.

INDEX OF ADVERTISEMENTS

✓ CHECK THESE FREE CATALOGS NOW!

Mail Coupon to Order Those You Need

These helpful booklets are free. Just circle numbers you want on coupon and mail or write the manufacturer direct and mention PUBLIC WORKS. This service is restricted to those actually employed in public work.

NEW LISTINGS

A Handbook of Sewer Cleaning Equipment and Methods

46. A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated new Sewe-RodeR and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

Be Sure to Investigate the "Spiralflo" Clarifier Design

92. Be sure you have information on the new Yeomans Spiralflo clarifier, adaptable to either water or sewage plants. 8-page bulletin explains operation of unit, gives plans, specifications and results of actual installations. Write for bulletin 6790, Yeomans Brothers Co., 1411 No. Dayton St., Chicago 22, Ill.

Hydraulic Controlled Shovel Does Many Jobs

161. Fully convertible ½-yd. shovel is crawler-mounted, serves as shovel, trench hoe, clamshell, dragline or pile-driver. Specs and details of hydraulic controls in 16-page illustrated bulletin No. 2356, published by Link-Belt Speeder Corp., Dept. PW, 307 N. Michigan Ave., Chicago 1, Ill.

How Wax on Snow Plow Blades Speeds Up the Work

184. Descriptive bulletin covers application of Sno-Rem snow plow wax to make plowing work faster and easier by elimination of snow piling on moldboards. Copies from Speco, Inc., 7308 Associate Ave., Cleveland 9, Ohio.

Manual on Ice Control With Calcium Chloride

185. A 26-page manual on the use of calcium chloride in the treatment of abrasives for ice control. Methods of storage and spreading are described including results of field tests on these subjects. Free copies from Calcium Chloride Assn., Dept. PW, 1028 Connecticut Ave., NW, Washington 6, D. C.

Data on Chlorine Treatment for Camps and Small Water Supplies

186. Full information on two models of hypochlorinators with adjustable or fixed dosages from 5 to 25 gallons of solution per day furnished by Precision Machine Co., 241 Pearl St., Somerville 45, Mass. Units are simple to maintain, accurately feed hypochlorites or other solutions.

Air for Activated Sludge and Other Aeration Processes

187. Quiet operation, high efficiency and compact size are features of the Chicago "Standardaire" positive displacement blower. Wide range of capacities available to fit your needs. Details and performance data from Chicago Pump Co., 2348 Wolfram Ave., Chicago 18, Ill.

What Paving Breaker Should You Use for the Job?

188. Details on paving breakers and sheeting drivers in several weight classes tell just where to use each model for best results. Table of specs shows dimensions, air pressures. Get bulletin H-1200-B40 from Worthington Pump & Machinery Corp., Harrison, N. J.

Protect Metal and Concrete Surfaces Against Severe Corrosion Conditions

189. Two bulletins show how and where to apply Koppers Bitumastic coatings to protect against severe corrosion conditions of aggressive soils, fumes, sewage. One economical application can save many dollars loss from corrosion. Use coupon or write Koppers Co., Inc., Tar Products Div., Pittsburgh 19, Pa.

Special Publication on Rock Crushing and Screening Lubrication

190. A technical publication devoted to rock crushing and screening lubrication features describes special problems of this type of machinery, shows typical bearing designs, and includes a handy chart for selection of best lubricants. Published by The Texas Co., 135 E. 42nd St., New York 17, N. Y.

Handy Road Equipment Bulletin

191. One handy catalog covering a complete line of road equipment describes power graders, maintainers, front-end loaders and power sweepers, with grader and maintainer attachments for special jobs. All equipment users should get a copy from Meili-Blumberg Corp., New Holstein, Wis.

Complete Catalog for Engineers Shows Sewage Plant Equipment

110. A complete, 44-page catalog gives engineering data on Jeffrey equipment for water, sewage and industrial waste treatment plants including screening, screenings grinders, grit collectors and washers, settling tank collectors, feeders, Floctrols, mixers and other mechanical equipment. Use coupon to get Catalog 775-A, Jeffrey Mfg. Co., Columbus 16, Ohio.

Excellent Booklet Shows Aerial Mapping Technique

192. A clear explanation of the technique of aerial topographic map production is given in "Wings for the Transit." Striking photographs trace aerial photos to final map. An excellent bulletin for public works and planning officials. Use coupon or write Lockwood, Kessler & Bartlett, Inc., 32 Court St., Brooklyn 2, N. Y.

Preventing Corrosion by Salt Used on Streets and Highways

150. Technical data on characteristics, test results and results in use of the Nalco Corrosion Inhibitor No. 818-C are given in a new leaflet. Data based on winter 1948-1949 shows how small dosage of inhibitor protects exposed metal surfaces. Get Bulletin 44 from National Aluminate Corp., Dept. PW, 6198 West 66th Place, Chicago 38, Ill.

CONSTRUCTION EQUIPMENT

Data Book on Universal Concrete Cribbing

21. Shows typical sections for designing walls, pictures many applications, specifications, etc. Get the facts today about this economical reinforced concrete cribbing. Universal Concrete Pipe Co., Dept. PW, 297 So. High St., Columbus 15, Ohio.

Solve Your Drainage Problems This Easy, Permanent Way

28. Useful new 60 page catalog on standard corrugated pipe, multi-plate pipe and arches and 18 other drainage and related products for culverts, sewers, subdrains, flood control, airports, water supply and other types of construction. Ask for "Armco Products for Engineering Construction," Armco Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

CLIP AND MAIL TODAY

READERS' SERVICE DEPT.
PUBLIC WORKS MAGAZINE
310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in the Readers' Service Dept. of your November issue. (Circle catalogs you need.)

Booklets from Pages 65-69:

21	22	25	27	28	33	34	35	41	42	44	46
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New Products, Pages 60-63:

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THIS COUPON NOT GOOD AFTER DECEMBER 31st

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

Keep That Trench Pumped Really Dry!

93. To find out how well a Homelite Carryable Pump handles large volumes, seepage, mud, write today for illustrated bulletin L-503 containing data of great value to all pump users. Write Dept. PW, Homelite Corp., 2110 Riverdale Ave., Port Chester, N. Y.

52-Page Data-Packed Bulletin On Contractors' Pumps

95. Tables for pump size determination on every excavation job, pipe friction loss, attitude effects and lots of other valuable data are included in this comprehensive booklet illustrating the many Jaeger "sure-prime" pump applications. Get your copy (catalog P45) by checking our coupon or writing the Jaeger Machine Co., Dept. PW, Columbus 16, Ohio.

Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

Special Pumps to Fit Any Dewatering Job

101. Centrifugal Pumps. Long lasting, self-priming, non-clogging pumps for quickly dewatering trenches and similar construction jobs. Ask for Bulletin 7-LW-13. Gorman-Rupp Co., 320 No. Bowman St., Mansfield, Ohio.

The Right Tractor For Your Job

116. Whether you need a front-end loader, snow plow, bulldozer, sweeper or mower, International wheel tractors combine correctly with allied equipment to do the job. Your choice of gasoline or diesel units is illustrated in Bulletin A-103JJ. International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

Check "Gunite" Concrete For Every Application

158. Big 44-page book illustrates "Gunite" uses for both repair and new construction of sewers, tanks, dams, swimming pools, and all concrete structures. A multitude of applications. Be sure to check coupon or write Pressure Concrete Co., Dept. PW, 315 S. Court St., Florence, Ala.

How to Get Accurate Subsurface Information

172. For positive knowledge of subsurface soil conditions an accurate sample is needed. The compact and complete Acker Soil Sampling Kit includes 12 soil and earth sampling tools. Get details in Bulletin 26. Acker Drill Co., Inc., Dept. PW, Scranton 3, Pa.

STREETS AND HIGHWAYS

Strong, Speedy, Low-Cost Maintainer Has Many Uses

22. BG Maintainer, a powerful speedy, low-priced machine for light road maintenance. Full details in illustrated folder. Huber Mfg. Co., Dept. PW., Marion, Ohio.

Power Saw Speeds Pruning, Clearing

69. Don't wait until storms have broken limbs and felled trees before finding out about the new light-weight engine powered chain saw announced by McCulloch. Ideal for all contracting and tree-maintenance operations. Get bulletin from McCulloch Motors Corp., Dept. MP, 6101 W. Century Blvd., Los Angeles 45, Calif.

Open Steel Mesh Pavement for Bridges

72. A pavement that is self-cleaning, self-draining, light of weight, strong, durable, fireproof, economical and requires no maintenance, is described in a 24-page catalog by Irving Subway Grating Co., 5053 27th St., Long Island City 1, N. Y.

Just Right for Fast, Small Asphalt Mixes

90. The Foote Kinetic Mixer delivers 3 cu. ft. in 30 seconds. Portable and easily operated. Get Bulletin K-100 from The Foote Co., 1954 State St., Nunda, N. Y.

Fast, Efficient Skid-Proofing

114. Get full facts about Baughman Light-Weight Cinder Spreaders, fast operators for cinders, sand, salt, chips, etc. Free flowing at low temperatures. 9-17 cu. yd. capacity. Write Baughman Mfg. Co., 1111 Shipman Road, Jerseyville, Ill.

How to Speed Curb and Gutter Work

126. Here's a 24-page bulletin illustrating form set-ups for every type of curb and gutter work. Send for Bulletin 2259 and learn how to speed up the job with Blaw-Knox Steel Street Forms. Write Blaw-Knox, Dept. PW, Farmers Bank Bldg., Pittsburgh 22, Pa.

Adhesive Joint Sealers and How They Are Applied

130. Learn how joints are prepared and Flintseal Hot-Poured Joint-Sealing compound applied. Series of pictures shows each step and explains every operation for good joint construction. On request from The Flintkote Co., Dept. PW, 30 Rockefeller Plaza, New York 20, N. Y.

SEWERAGE AND REFUSE

New Unit Cleans Catch Basins in a Jiffy

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How to Lower Costs Of Refuse Collection

35. For saving trucks, labor, and time in city rubbish collection get details of the new Dumpster-Kolector described in literature just published by Dempster Bros., Inc., 996 Higgins, Knoxville 17, Tenn.

Design Details for Sludge Collectors

42. Booklet No. P.W. 1982 on Link-Belt Circuline Collectors contains sanitary engineering data and design details. Catalog No. 1742 on Straightline Collectors, contains layout drawings, illustration pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

Useful Design Data on Sedimentation Tanks

99. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, Dept. P.W., 570 Lexington Ave., New York 22, N. Y.

Pipe That Is Immune to Tuberculation and Corrosion

104. Transite Pipe. The high strength and low weight of pipe moulded under pressure from asbestos fibre and cement, together with its immunity to tuberculation and corrosion is the subject of a 32-page pamphlet. Johns-Manville, Box 290, New York 16, N. Y.

Be Sure to Check These Digester Features

117. Floating covers for digesters, their advantages and details of construction, and suggestions for digester operation are contained in a 42-page catalog. Write Pacific Flush-Tank Co., Dept. PW, 4241 Ravenswood Ave., Chicago 13, Ill.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connersville Blower Corp., 310 Poplar Ave., Connersville, Ind.

Standard Translot Blocks For Filter Underdrains

145. Proper filter underdrainage is extremely important. Specifications and installation details for transverse slot filter underdrains made of durable vitrified clay are available from Texas Vitrified Pipe Co., Mineral Wells, Texas.

Conkey Filters for Sewage Sludge Disposal

180. Development of Conkey sludge filters and applications to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give average anticipated results. Write General American Transportation Corp., Process Equip. Div., 10 East 49th St., New York 17, N. Y.

WATER WORKS

Makes Underground Pipe Installations Easy

25. One-man operated Hydraulic Pipe Pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts and prices, ask for booklet S-117, Greenlee Tool Co., 2050 Columbia Ave., Rockford, Ill.

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cutaway views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Solve Corrosion Problems With This Special Alloy

41. "Everdur Metal" is title of an 8-page illustrated booklet describing advantages of this corrosion-resisting alloy for sewage treatment equipment, reservoir, and waterworks service. Dept. P.W., the American Brass Co., 25 Broadway, N. Y. C.

Eliminate Taste and Odor From Your Water

53. Technical pub. No. P.W. 213 issued by Wallace & Tiernan Co., Inc., Newark, 1, N. J., describes in detail taste and odor control of water with Break-Point Chlorination. Sent free to any operator requesting it.

How to Estimate Quantity Of Joint Compound Needed

87. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in bulletins issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

WATER WORKS (cont.)

Chem-O-Feeders for Automatic Chemical Feeding

60. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation, treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. %, 96 Codding St., Providence 1, R. I.

Helpful Data on Hydrants

64. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M. & H. Valve & Fittings Co., Dept. P.W., Anniston, Ala.

Cast Iron Pipe and Fittings For Every Need

65. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Dept. PW, Burlington, N. J.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co., Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

Job Data Offered on New Steel Water Lines

80. A 12-page illustrated report listing pipe diameters, pipe wall thicknesses, line pressures, coatings, engineering personnel, etc., is entitled "A Report of Dresser-Coupled Steel Water Lines in the Year 1948." A copy will be sent by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Flow Meters With Many New Features

91. The new Propelflo meter for main-line metering introduces many new features you will want to look into. Send for latest bulletin today. Builders Providence, Inc., 16 Codding St., Providence 1, R. I.

Cast Iron Pipe Handbook— Handy Pocket Size

97. Catalog of Universal Cast Iron Pipe and Fittings, pocket size, illustrated, including useful reference tables and data. Sent by The Central Foundry Co., Dept. P.W., 386 Fourth Ave., New York 16, N. Y.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Just Press the Button— It Does the Rest

103. Automatic Filter Operation. The Robotrol automatically back washes, rewashes and returns the filter to service. Illustrated Engineering Bulletin 1230. Infilco Inc., 325 W. 25th Place, Chicago 16, Ill.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

How About Centrifugal Pumps?

108. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Write to Dept. P.W., Peerless Pump Div., Food Machinery and Chemical Corp., 301 W. Ave. 26, Los Angeles 31, Calif.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Do You Ever Have Leaks to Fix?

124. You'll want to know about the full line of "Skinner-Seal" clamps for repairing bell and socket joint leaks and broken mains. Step-by-step procedures are illustrated in catalog 41, a handsome 40-page presentation which shows applications of all fittings. Write M. B. Skinner Co., Dept PW, South Bend 21, Ind.

The Modern Way to Filter Swimming Pool Water

129. That's the title of a bulletin full of facts about Bowsers' new diatomite filter to produce clear, sparkling, clean water at low cost. Occupies small space, doesn't waste water. Gives sizes to use, performance charts, etc. Write Bowser, Inc., Dept. PW, 1395 Creighton Ave., Ft. Wayne, Ind.

Find Buried Pipe The Goldak Way

131. Finding buried pipe is easy with the new Featherweight Goldak Pipe Locator. An easy-to-read illustrated bulletin tells the full story quickly. Address: The Goldak Co., 1544 Glenoaks Blvd., Glendale 1, Calif.

All About Cement-Mortar Lining of Water Mains

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centriline Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

Here's Data on All Swimming Pool Needs

135. Well illustrated bulletin describes filters, water softeners, hydrogen ion plants, chlorine feeders and complete equipment for swimming pools, etc. Copy sent on request by Dept. PW, Chemical Equipment Co., 223 Center St., Los Angeles 54, Calif.

Turbidity Measurements Without Special Standards

141. The Hellige Turbidimeter is designed to avoid tedious suspension standards preparations and provide accuracy in the lower ranges by using the Tyndall Effect. Catalog 8000 shows exactly how this instrument operates and how it is used. Write Hellige, Inc., Dept. PW, 3718 Northern Blvd., Long Island City 1, N. Y.

Newly Designed Watersphere— the Modern Elevated Tank

146. A handsome leaflet describes the newly redesigned Watersphere, built in capacities from 25,000 to 250,000 gals., 50 to 125 ft. to bottom. Sphere is supported on a single, gracefully curved column. Be sure to investigate this tank of pleasant appearance and modern welded construction. Data from Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

"Tailor-Made" Pumps Fit Your Requirements

156. Application-Engineered vertical turbine pumps to suit your particular pumping requirements are completely described in Bulletin P-178. Details of optional driving and pumping arrangements clearly illustrated. Get your copy from A. O. Smith Corporation, Dept. PW, Milwaukee 1, Wisc.

Complete Equipment for The Complete Pool

157. Latest equipment for recirculation, filtration, chlorination, softening and pH control are described in Permutit Bulletin No. 2157. Manual and automatic valves explained and many installations diagrammed. Complete specifications given. Permutit Co., 330 West 42nd St., New York 18, N. Y.

Helpful Book Gives Pipe Flow

159. This handy 40-page pocket size book titled "Measurement of Water Flow Through Pipe Orifice with Free Discharge" explains the Layne pipe orifice meter method of computing water flow. Includes flow graphs for various size pipes. Layne & Bowler, Inc., Box 215, Hollywood Station, Memphis 8, Tenn.

SNOW FIGHTING

For High-Speed Snow Removal

44. "Frink One-Way Sno-Plows" is a four-page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow, Frink Sno-Plows, Inc., Clayton, 1000 Islands, N. Y.

Thrifty Salt Spreader for Snow and Ice Control

173. Check the Tarco "Scotchman" for fast, thrifty salt application to icy roads. Stainless steel spreader has weatherproofed engine. Get all data from Tarrant Mfg. Co., Jumel St., Saratoga Springs, N. Y.

Chemical Stops Salt Corrosion

174. A new chemical has been developed which, when mixed 1 pound to 100 pounds of salt, prevents any corrosion of automobiles by the salt. Harmless; colorless; odorless. Permits free use of salt for ice and snow control without complaint by drivers. Calgon, Inc., Pittsburgh, Pa.

End Dangerous Ice Hazards

179. Ice prevention on highways, streets and airport runways with Sterling "Auger Action" rock salt is described in illustrated bulletin PW issued by International Salt Co., Inc., Scranton, Pa.

POWER AND LIGHT

Dual Fuel Engines for Municipal Power

27. A new 8-page illustrated bulletin, No. 4811, describes Superior Dual Fuel Diesel engine operation and illustrates the simplicity of controls with fuel conversion by either push buttons or hand lever. Copies are available from Superior Engine Div., Dept. PW, The National Supply Co., Springfield, Ohio.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

Using Sewage Sludge Gas for Power Generation

160. The Fairbanks-Morse Diesel and Dual Fuel Engine, Model 31A can operate on either sludge gas or oil to supply steady power output despite fluctuations in gas production. Detailed spread shows passage of fuel, air, oil and water on cutaway section. Get Bulletin 3100 AG31 from Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

Dependable Power For Every Purpose

170. Rugged Novo engines are built to handle heavy-duty loads; operate on gasoline, kerosene, gas-gasoline. Several models range from 4 HP to 32 HP. Get bulletins from Novo Engine Co., Lansing, Mich.

WORTH TELLING . . . . By Arthur K. Akers

According to **Anthony Anable**, on-the-job director of public relations of the **Dorr Company**, that firm has acquired Pan-American Engineering Company's metallurgical jigs and sewage aerators. **W. G. Moore**, formerly design engineer for the latter, is added to the Dorr New York engineering staff.

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Robert T. Richey has gone to **The Refinite Corporation**, Omaha, Neb., as sanitary engineer with the Hays Process of sewage treatment as his particular "baby." An article by Mr. Richey on an industrial housing plant will be a feature of this issue of PUBLIC WORKS. So that you may see that he is in good hands, we portray below his new boss, Mr. **C. A. Spaulding, Jr.**, of Refinite.

Mr. Spaulding

Mr. King

Above we repair an oversight, on the sound theory that it is "better late than never." We refer to the picture of Vice President **O. H. King** of the **Pacific States Cast Iron Pipe Company**, whose new Super deLavaud pipe plant was mentioned in our last issue. It took a little blasting, but we finally got Harvey's picture!

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Gulf Oil Corporation has appointed **Andrew E. Brice** assistant general manager for contractor market sales. This position was newly created in the firm's reorganization of its domestic marketing department.

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Mack Truck Company clearly does not fear the future! A southwestern sales division with headquarters in Dallas, in charge of **D. C. Wheeler**, is announced. New blood in their Newark and New Brunswick, **N. J.**, branches is represented by **W. J. Frederick** and **G. F. Zeller.**

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Ray McLean was elected president of **The Jaeger Machine Company** of Columbus, Ohio, in September, succeeding O. G. Mandt, retiring for reasons of health. Mr. McLean has been executive vice president for the past four years, and is also a director of the Construction Industries Association.

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Not content with appointing two new distributors for territories centering around Philadelphia and Chicago, **Ralph B. Carter Company** of Hackensack, N. J., is looking for others to handle their complete line of Humdinger pumps. **Fred Lewin**, vice president in charge of sales, wants to hear from distributors or dealers interested in taking on this line. Address 206 Atlantic Street, Hackensack, N. J.

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As visible proof that **Chicago Pneumatic Tool Company's** new $5,000,000 upstate New York plant is no mere "shack" as some perhaps envious souls have reportedly dubbed it, we show below its picture. What

New Chicago Pneumatic plant.

we can't show is the long list of modern improvements and ideas which this plant will include. **Modern** is a modest summary.

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Harry E. Lewis has been assigned to the Foreign and Export Department, **Worthington Pump & Machinery Corporation**, Harrison, N. J. Mr. Lewis was formerly Works Comptroller, Holyoke, (Mass.) Works, and is succeeded there by **George Bourque.**

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The Asphalt Institute, New York, **Bernard E. Gray**, general manager, has appointed **Arvin S. Wellborn** as managing engineer of its Pacific Coast Division with offices in San Francisco, Seattle, and Los Angeles.

Mr. Wheeler

Mr. Wellborn